ADVERTISING PAGES REMOVED

An index to Volume 43 of THE RUBBER AGE will be found following page 60 of this issue.

THE RUBBER AGE, published on the 15th of each month by the Palmerton Publishing Company, Inc., at East Stroudsburg, Pa. Editorial and Advertising offices at 250 West 57th Street, New York City. Established 1917.

Entered as Second Class Matter, October 20, 1933, at the Post Office at East Stroudsburg, Pa., under Act of March 3, 1879.

Subscription Rates: Domestic, $2.00 a year; Canada, $2.50; Foreign, $3.00. Single copies, up to 3 months old, 25 cents; over 3 months old, 50 cents.

Telephone COlumbus 5-2923, 5-2924

Contents Copyrighted 1938 by the Palmerton Publishing Company, Inc. Indexed in Industrial Arts Index.

PAUL L. PALMERTON.....President
E. D. OSBORN.....Vice-President and Sec'y
PETER P. PINTO.....Treasurer

M. E. LERNER.....Managing Editor
R. E. GAINES.....Circulation Manager
PETER P. PINTO.....General Manager

THE RUBBER AGE

ESTABLISHED 1917

COVERS ALL PHASES OF THE PRODUCTION AND MARKETING OF CRUDE RUBBER AND THE MANUFACTURE AND DISTRIBUTION OF RUBBER GOODS

Vol. 44 OCTOBER, 1938 No. 1

INDEX TO CONTENTS

Synthetic Substances with Rubber-Like Properties 21
By E. R. Bridgwater

Air Seal Compound 24

Carbitum 24

Use of Rubber Base Paints 25
By George N. Bick

Air Conditioning for the Rubber Glove Factory 27

Importance of Colloid Chemistry and Physics 28
By Dr. Ernst A. Hauser

Resistance of Tires to Skidding 28

Charles Goodyear (A Biography) 29
By P. W. Barker

Hard Rubber as a Plastic Material 32

Freezing and Melting of Rubber 32

Obtaining Rubber by Freezing 32

Establishes American Crude Rubber Development Bureau 33

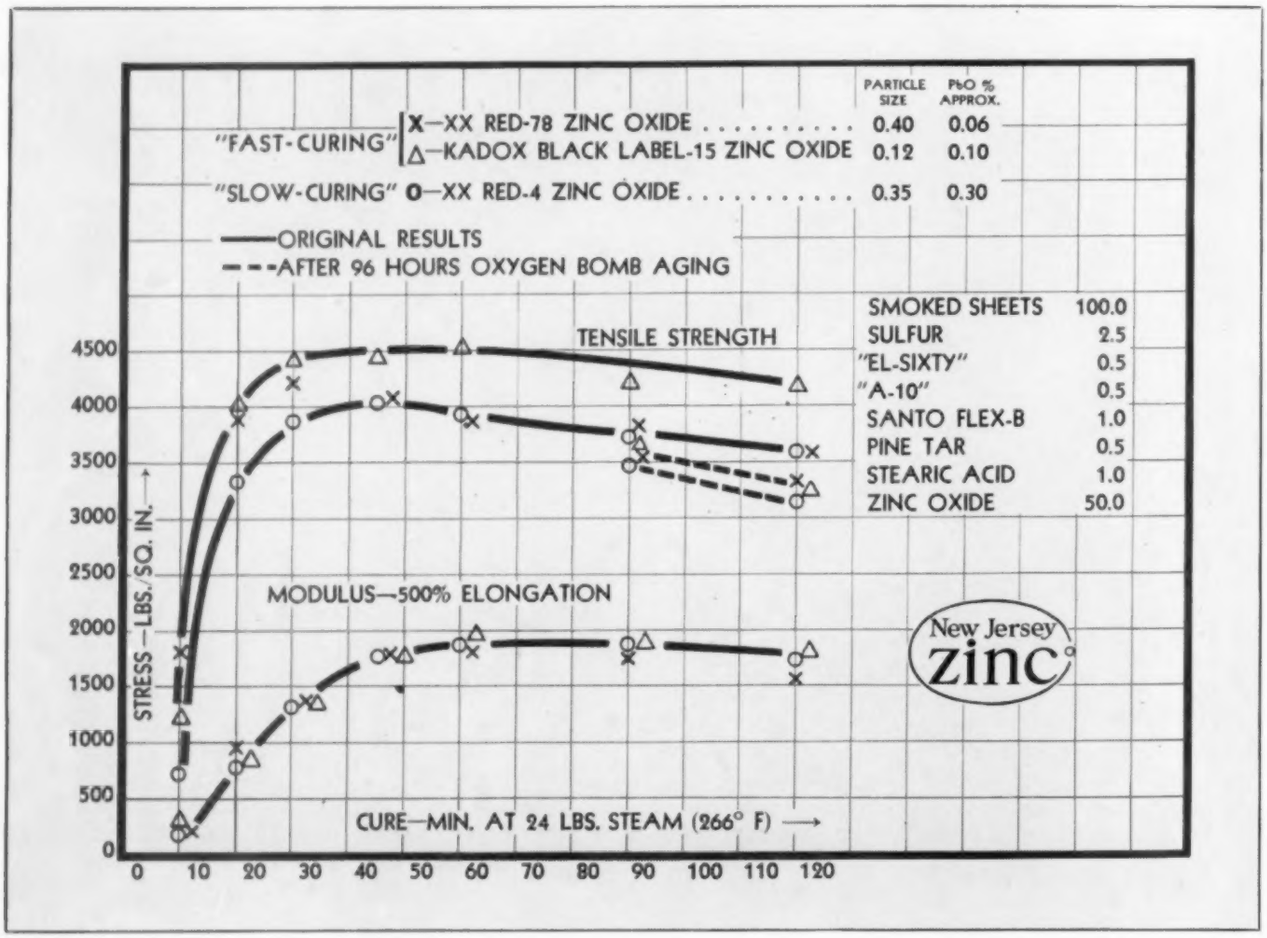
New Equipment Section 34

REGULAR DEPARTMENTS

Late Domestic News 37
Financial News 45
Book Reviews 35
Los Angeles News 42
Names in the News 46
Rubber, Cotton Markets 50
Editorials 36
Chemical Markets 51
Statistics 52
Market Place 56
Advertising Index 60
Classified Ads 60

"Fast-" and "Slow-Curing" Zinc Oxides with "EL-SIXTY" and "A-10"

No. 62 of a series of charts showing a comparison of "FAST-" and "SLOW-CURING" zinc oxides with typical accelerators.


PARTICLE SIZE
PbO % APPROX.
"FAST-CURING" X—XX RED-78 ZINC OXIDE 0.40 0.06
Δ—KADOX BLACK LABEL-15 ZINC OXIDE 0.12 0.10
"SLOW-CURING" O—XX RED-4 ZINC OXIDE 0.35 0.30
——ORIGINAL RESULTS
– – –AFTER 96 HOURS OXYGEN BOMB AGING
TENSILE STRENGTH
MODULUS—500% ELONGATION
SMOKED SHEETS 100.0
SULFUR 2.5
"EL-SIXTY" 0.5
"A-10" 0.5
SANTO FLEX-B 1.0
PINE TAR 0.5
STEARIC ACID 1.0
ZINC OXIDE 50.0
STRESS—LBS./SQ. IN. →
CURE—MIN. AT 24 LBS. STEAM (266° F) →
0 500 1000 1500 2000 2500 3000 3500 4000 4500
0 10 20 30 40 50 60 70 80 90 100 110 120
New Jersey zinc

Horse Head XX Red-4 retards "El-Sixty" and "A-10" in a 9 volume loading indicating scorch inhibiting properties. "Fast-curing **XX Red-78** and **Kadox Black Label-15** give somewhat higher original results, but the advantages are lost after 96 hours of oxygen bomb aging.

UNIFORM QUALITY ZINC OXIDES

THE NEW JERSEY ZINC COMPANY

The Rubber Age

Published Monthly at East Stroudsburg, Pa.
Editorial and Advertising Offices: 250 W. 57th St., New York

Vol. 44 October, 1938 No. 1

Synthetic Substances With Rubber-Like Properties

By E. R. Bridgwater

Manager, Rubber Chemicals Division,
E. I. du Pont de Nemours & Company

EDITOR'S NOTE: Although the accompanying paper incorporates a number of fundamentals well known to rubber technologists concerning the various commercial synthetic substances with rubber-like properties, it represents a comprehensive and exhaustive review of these materials from the standpoint of their chemical construction, physical properties, and methods of testing. It was presented by the author at the Symposium on Rubber held on October 5 in Providence, Rhode Island, sponsored by the Committee on Rubber and Plastics, Process Industries Division, American Society of Mechanical Engineers. It is also appearing simultaneously in the October, 1938, issue of "Mechanical Engineering," official organ of the Society.

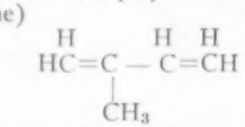
ALTHOUGH synthetic products having some of the properties of rubber have been known for many years, their large-scale commercial development dates only from the beginning of the current decade. Today, a great profusion of more or less rubber-like synthetic products is available to the engineering profession—a profusion that must be confusing to engineers who have not had an opportunity or occasion to make a careful survey of the field. The confusion is heightened by the tendency of many who are engaged in promoting products or ideas to draw broad generalizations in terms that are devoid of exact meaning. Engineers who pride themselves on their accuracy of thought and expression may state that "synthetic rubber is more oil-resistant than natural rubber" failing to recognize the statement as meaningless because (*a*) the term "synthetic rubber" is used in a loose and inaccurate sense and no one knows how broad its connotation may be and (*b*) the term "oil resistance" is equally indefinite. In order to promote clear thinking, let us first consider the meaning of the terms "synthetic rubber" and "rubber-like properties."

Strictly speaking, there is no commercial product that can be called synthetic rubber because, if we follow the accepted usage of the past, synthetic rubber would be a product substantially identical with natural rubber in chemical structure and physical properties. For example, synthetic camphor is so called because it is camphor and differs from natural camphor only in that it is made by a synthetic process rather than extracted from a tree. The principal uses for camphor are for plasticizing pyroxylin and as a medicant for the relief of common colds. A new plasticizer for pyroxylin or medicinal agent for the relief of colds may be discovered which resembles camphor in some respects

but has certain properties which appear to make it superior for one of these uses. But such a new product would hardly be called synthetic camphor.

The statement "synthetic substances with rubber-like properties" might be defined to include only substances that resemble rubber in all its important properties, but such a definition would exclude certain products which resemble rubber at least in extensibility, and are of commercial importance. We shall therefore consider the term to mean substances that resemble rubber in the single property of extensibility or deformability under moderate loads, coupled with a tendency to recover their original form when the load is removed, although not necessarily to a degree comparable to the recovery exhibited by natural rubber.

Synthetic products that are rubber-like in this broad sense fall into two broad groups: (*a*) Those that resemble rubber in chemical structure and (*b*) those that do not. The chemistry of the first group has been admirably presented by Whitby and Katz *(1)*. Summarizing briefly, rubber is a polymer of beta-methyl-butadiene (Isoprene)



If the methyl group CH_3 is replaced by a hydrogen atom H, we have butadiene. If it is replaced by a chlorine atom Cl, we have chloroprene. Polymerized butadiene, with or without the addition of modifying agents, is made in Germany and is known to the trade as Buna rubber or Perbunan. Polymerized chloroprene is made in the United States and is known generically as neoprene. Vulcanized neoprene products are also sold under a hundred or more trade names, each identifying the product of a certain manufacturer, but usually failing to identify it as neoprene. These materials, polymerized butadiene and polymerized chloroprene, resemble rubber quite closely, as might be expected from the fact that their progenitors possess the same chemical structure as isoprene, although in each case a substitution has been made in one of the chemical building blocks. Like rubber, they are vulcanizable; that is, when heated under proper conditions they become much less plastic, more elastic and less susceptible to changes in properties with changes in temperature. After vulcanization they cannot be remolded to another shape because of their loss of plasticity.

The other group of rubber-like synthetics consists of products whose chemical structure bears no resemblance to that of rubber, but which, nevertheless, share some of its properties. In this group are *(a)* the plastic glyptal resins *(2)*, condensation products of a polybasic acid, such as phthalic or adipic, with a polyhydric alcohol, such as glycerin or ethylene glycol, *(b)* the alkylene sulphides *(3, 4)*, made by condensing ethylene dichloride or other dihalides with an alkaline polysulphide, such as are sold under the trade name "Thiokol," *(c)* polyvinyl alcohol *(5)*, and *(d)* plasticized polyvinyl resins *(6)* such as are sold under the trade name "Koroseal." These products, and many other plastics which have never outgrown the test-tube stage, have the rubber-like property of extensibility or deformability under relatively light loads. Certain of these products, especially the alkylene polysulphides, are vulcanizable in a limited sense of the word; that is, they become less plastic and more elastic when heated, although after vulcanization they are still definitely thermoplastic and, under proper conditions, capable of being remolded to other forms. Others, such as the plasticized polyvinyl resins, are definitely nonvulcanizable and can be hot-molded and remolded without altering their properties.

Physical Properties

The properties of vulcanized products derived from polychloroprene *(7, 8, 9, 10)*, and polymerized butadiene *(11)* have been described in numerous articles and pamphlets published or inspired by the manufacturers of those products. Likewise, the properties of certain compositions derived from the alkylene polysulphides *(12, 13)*, from the plasticized polyvinyl resins *(14, 15)*, and from the glyptal resins *(2)* have been made available by the manufacturers for the benefit of prospective consumers.

It is difficult to compare the properties of the vulcanizable polymers of butadiene and of chloroprene with those of rubber because the vulcanized products made from them have a very wide range of properties, which properties depend upon the kind and amount of other ingredients that are mixed with them and conditions of vulcanization. This difficulty becomes an impossibility when we broaden the field to include the thermoplastic rubber-like materials which are comparable with rubber and with the vulcanizable synthetics only over a narrow temperature range and with respect to only a limited number of physical properties. Although any attempt at direct comparison of these materials would be misleading, it should be helpful to consider methods of evaluation and the significance of some of the terms commonly used in reporting their properties.

Oil Resistance. By oil resistance we mean the degree to which a material retains its useful properties and serviceability in the presence of oils. The most obvious, but seldom the most important, change that occurs when the rubber or a rubber-like material is immersed in an oil is the change in volume. Scott *(16)* showed that the swelling which is characteristic of rubber may be divided into two separate phases *(a)* the initial swelling which proceeds rapidly in a few hours or days to such a point that the rubber is incapable of immediately imbibing any more of the particular solvent at the temperature of test, and *(b)* the slower continued increase in volume which represents deterioration of the rubber by the solvent.

The initial swelling as measured by a test extended over a period of a month or less has sometimes been taken as a measure of oil resistance. This may be very misleading because the change in physical properties that have to do with the serviceability of the product is not necessarily proportional to change in volume *(17)*. For example, chloroprene rubber can be compounded so as to undergo no change at all in dimensions in any given oil at any specified temperature, but such a nonswelling compound is frequently not the most serviceable one that could be produced.

The second phase of the swelling is of great importance because it enables one to establish a trend from which the condition of the product after several years' contact with oil can be roughly forecast. Although important deductions may be drawn from the curve representing change of volume with time, and especially the trend of the curve after a temporary equilibrium has been reached between the rubber-like material and the solvent, it is nevertheless true that the only reliable way to determine the oil resistance of a rubber-like synthetic is to give it a long-time test under conditions comparable to those that may be encountered in service including flexing, compression or other mechanical factors that may be involved, and heat, where it is a factor.

Short-time tests are especially unreliable as a means of forecasting the resistance of rubber or rubber-like products to hydrocarbons which contain small amounts of nonhydrocarbon impurities, or materials that are added in small amounts for a specific purpose. Slight

modifications of the constitution of the oil or solvent seldom affect the first phase of swelling but may profoundly affect the second phase; that is, they may cause progressive deterioration of the rubber or rubber-like material which would not be forecast from a brief swelling test.

One is frequently concerned not only with the effect of an oil or solvent on a rubber-like material, but also with the effect of the rubber-like material on oil. For example, plasticized polyvinyl resins or compositions derived from polymerized chloroprene or butadiene may decrease in volume if they contain an excessive amount of plasticizers due to extraction of the plasticizer or softener by the oil. The decrease in volume may or may not be objectionable in itself, but the contamination of the oil is quite likely to be objectionable. Such contamination as occurs is usually due to added compounding ingredients rather than to the base material itself.

Sunlight Resistance. The deterioration of rubber in sunlight is believed to be due primarily to surface ozonization. Most of the rubber-like synthetics are more resistant to this type of deterioration than is natural rubber, and some of them may be compounded so as to be practically immune to this type of failure. The degree of difference in the resistance of the various synthetics is dependent upon the type of compounding ingredients used and the conditions of exposure; that is, whether or not the rubber-like product is under tension or is subjected to flexing or abrasion. Attempts have been made to evaluate sunchecking resistance in the laboratory by the use of a Fade-O-Meter or a similar intense source of artificial radiation, but it is generally conceded that the only reliable evaluation is a service test.

Abrasion Resistance. It is impossible to speak of the abrasion resistance of rubber or any synthetic material without defining the exact type of compound under consideration and the type of abrasive condition that is to be met. Each of these synthetic products has been found to have abrasion resistance equal to or superior to that of rubber under conditions favorable to that particular product. However, it would be foolhardy to state that any synthetic product is equally or more abrasion-resistant than rubber under all conditions of service. As a matter of fact, it is impossible even to state broadly that one rubber compound is more abrasion-resistant than another. Pure gum rubber makes a more durable lining for sandblast hose than the type of compound used for tire treads; however, pure gum rubber would make a very poor tire tread indeed. With respect to the thermoplastic products, it should be borne in mind that the heat generated during abrasion may be an important factor. The manufacturers of rubber-like synthetics are generally aware of the conditions under which their products show best results and can tell a prospective user what results may be expected under any given set of conditions. The final answer is, of course, a service test on a composition designed for the particular job at hand.

Elasticity. By elasticity we mean not extensibility, but rather the ability of the material to regain its original form after removal of a force which has caused distortion. The rate and degree to which the product returns to its original dimensions are a function not only of the degree of distortion but of time and temperature. Generally speaking, the polymers of butadiene and of chloroprene have elasticity comparable to that of natural rubber. They may be either superior or inferior depending upon the kind and amount of compounding ingredients used and the conditions of test. The plasticized polyvinyl resins are quite elastic at low temperatures but, of course, suffer plastic flow at elevated temperatures. The alkylene polysulphides have elasticity comparable to that of rubber when measured under conditions of test that involve only momentary impact, such as the bounce of a ball. However, when distorted by a load that is applied over a period of time they show considerable plastic flow. This is especially true when the test is conducted at elevated temperatures.

Chemical Resistance. The rubber-like synthetics are generally more resistant to oxidation and to the destructive action of chemicals than is natural rubber. Obviously, however, the chemical resistance and oxidation resistance depend to a great extent upon the nature of the added compounding ingredients and the conditions of vulcanization (for those that are vulcanizable). Moreover, all of these products have their weak points. The alkylene polysulphides are attacked by alkalies; certain modified butadiene rubbers are attacked by polar compounds; and chloroprene rubber and the synthetics in general with the sole exception of the plasticized polyvinyl resins are vigorously attacked by strong oxidizing acids such as chromic. The manufacturers of these products are generally able to provide information as to their suitability for use in connection with any given chemical.

Heat Resistance. There is no rubber-like material that is not affected to some extent by even moderate degrees of heat such, for example, as 100° C. Some of the butadiene polymers and the chloroprene polymers can be compounded to have greater resistance to heat than the best heat-resistant natural-rubber compounds, but it does not follow that any compound derived from polymerized butadiene or polychloroprene will have greater heat resistance than any rubber compound. Heat resistance is, of course, an indefinite term that requires definition before exact statements can be made regarding it. It is impossible to set the maximum temperature that any compound derived from rubber or a rubber-like synthetic will withstand without specifying the time of exposure, the conditions —whether exposed to air or to oils or to neither—and the degree and type of deterioration that may be tolerated before the product becomes unserviceable.

Specifications and Testing Methods

It has previously been emphasized that a service test is the only test which will definitely determine the relative serviceability of rubber and the various rubber-like synthetics for any purpose and where a service test is impractical, laboratory tests should be designed to simulate as closely as possible the condition of service. It is frequently necessary to provide some means of accelerating tests in order to get the answer in a reasonable length of time. Great care must be exercised in devising accelerated tests that will really be comparable to a longer test under conditions more closely approaching those encountered in actual use.

Certain rubber products that are used in substantial quantities for industrial purposes are purchased to specification. Frequently, such specifications call for a product having a certain minimum tensile strength, ultimate elongation, cold flow or other readily determinable physical properties. One should not lose sight of the fact that the properties of the rubber that are made the basis of the specification are frequently properties that come into play to a minor extent, if at all, in actual service. For example, rubber is seldom used under loads which even approach its ultimate tensile strength; hence, the only excuse for specifying tensile strength is that there may be some relationship between the tensile strength of a rubber compo-

sition and the less readily determinable physical properties which are directly related to the serviceability of the finished product.

This assumption is frequently contrary to fact as applied to rubber goods, but there is even less basis for assuming that because a type of natural rubber or chloroprene rubber having a certain tensile strength has been found to do a certain job satisfactorily any other synthetic or natural product would be inferior if it failed to display that same tensile strength. Generally speaking, the conventional tests used in specifications are grossly inadequate as a measure of the serviceability of some new product that may be offered to do a certain job but may be valuable as a means of checking the uniformity of succeeding deliveries of a product which has been completely evaluated by adequate performance tests.

Conclusion

It has been pointed out that the products included in the broad terms "synthetic rubbers" and "synthetic rubber-like materials" have little in common except the ability to stretch to several times their initial length before breaking. In fact, there is less similarity between some of these synthetic products and others than there is between some of them and natural rubber. Moreover, the properties of some of these synthetic products may be varied over such a wide range by compounding with other ingredients and vulcanizing under varying conditions that it is unsafe to generalize about any of them. The difficulty of drawing valid generalizations is further complicated by the fact that such terms as "oil resistance," "abrasion resistance" and "heat resistance" are devoid of exact meaning and, if valid conclusions are to be drawn regarding these or any other physical properties, the methods of measuring those properties must be exactly defined.

The only way to ascertain whether a rubber-like synthetic product will be suitable for a specific use is to analyze the conditions of service, prepare a composition whose properties approach as closely as possible the ideal revealed by that analysis, and test that composition under conditions related as closely as possible to those that may be encountered in service. It will probably never be possible to tabulate the properties of rubber-like synthetics in so comprehensive a manner that the engineer will be able to select the right product for any particular use by consulting a handbook. Today, at least, it is true that any general tables of properties that may be prepared would be so misleading as to do more harm than good. The engineer who would use rubber or rubber-like synthetics wisely must accept these facts and work within the limitations imposed by them.

BIBLIOGRAPHY

(1) "Synthetic Rubber," by G. S. Whitby and M. Katz, *Industrial and Engineering Chemistry*, vol. 25, 1933, p. 1204.

(2) "Alkyd Resins Developed into New Forms," by J. G. E. Wright, *Chemical and Metallurgical Engineering*, vol. 39, 1932, p. 438.

(3) U. S. patent 1,890,191, granted to J. C. Patrick.

(4) "The Formation of High Polymers by Condensation Between Metallic Polysulphides and Dihalogenated Hydrocarbons and Ethers," by J. C. Patrick, *Transactions of the Faraday Society*, vol. 32, 1936, p. 347.

(5) U. S. patent 1,672,156.

(6) U. S. patent 1,929,453, granted to W. L. Semon.

(7) "Effect of Oils and Chemicals on Duprene Compounds," by O. M. Hayden and E. H. Krismann, *Industrial and Engineering Chemistry*, vol. 25, 1933, p. 1219.

(8) "Physical Properties of Duprene Compounds," by E. R. Bridgwater, *Industrial and Engineering Chemistry*, vol. 26, 1934, p. 33.

(9) "The Neoprene Handbook," E. I. du Pont de Nemours & Company, Inc., Wilmington, Del.

(10) "The Neoprene Notebook," E. I. du Pont de Nemours & Company, Inc., Wilmington, Del.

(11) "Perbunan," Advance Solvents and Chemical Corp., New York, N. Y.

(12) "Thiokol Facts," The Thiokol Corp., Trenton, N. J.

(13) "Constitutions of Polysulphide Rubbers," by S. M. Martin and J. C. Patrick, *Industrial and Engineering Chemistry*, vol. 28, 1936, p. 1145.

(14) "Koroseal—A New Plastic," by S. L. Brous and W. L. Semon, *Industrial and Engineering Chemistry*, vol. 27, 1935, p. 667.

(15) "Koroseal," The B. F. Goodrich Company, Akron, Ohio.

(16) "The Swelling of Vulcanized Rubber in Liquids," by J. R. Scott, *Transactions of the Institution of the Rubber Industry*, vol. 5, 1929, p. 95.

(17) "The Testing of Rubber and Rubber-Like Materials for Oil Resistance," by O. M. Hayden, Proceedings of the American Society for Testing Materials, vol. 54, part 2, 1934, pp. 635-646.

Air Seal Compound

A NEW compound which will eliminate 90 per cent of all common tire punctures, according to the manufacturer, has been introduced by U. S. Air Seal, Inc., Girard, Ohio. Known as Air Seal, it is a plastic compound of English invention, developed and tested in Canada for the past several years, made up of asbestos, glucose, magnesia and other chemicals. The manufacturer guarantees that it will effectively seal porous tubes, will not injure but actually preserve rubber, will not bake or freeze in the tire, will not clog valves or impair functions, and will not interfere with vulcanizing or other necessary tire repairs. Further claims made by the company include: (1) Air Sealed tubes will outlast two or three casings; (2) It will enable users to get 25% more wear from their tires; (3) It automatically seals porous or leaky tubes; and (4) Air Sealed tubes need checking only at rare intervals.

Carbitum

THE latest compounding ingredient for rubber to be added to the line of materials handled by the Binney & Smith Company, New York City, is Carbitum, a solid hydrocarbon prepared from pure coal tar, used as a reinforcer and plasticizer. While contributing to the processing properties of uncured rubber, it is far more than an extender in its effect on the vulcanized article, according to Binney & Smith.

Carbitum is said to be highly resistant to oils, acids and alkalis. It is lustrous black in color and is supplied in small lumps. It has special application in footwear and finds its widest use in shoe soling where its reinforcing properties lend strength and abrasion resistance to the compound while its plasticizing action assures good workability of the stock in various factory operations.

To Owners of Noble's "Latex in Industry"

Purchased Prior to November, 1937

The author has prepared an addenda and errata list which represents not only errors in patent numbers and typography but which includes a number of references originally omitted from the book. This list, in printed form which may be readily pasted into the original copy, is available without cost. Address requests to THE RUBBER AGE, 250 West 57th Street, New York City.

Use of Rubber Base Paints

Need for a Coating Material for Use on Concrete Has Led to the Development of Special Chlorinated Rubber Paints

By George N. Bick
Essex Chemical Company, Newark, N. J.

ALTHOUGH our knowledge of the use of rubber as a protective material in our economic life dates back a considerable number of years, the use of rubber as a basic ingredient in the manufacture of paint is of comparatively recent development. Today paint is not only used for protective purposes, but it is also employed for its decorative value.

The increasing use of concrete has created a problem for the paint manufacturer in that he has had to supply a coating material which will enhance the appearance of this structural material, and at the same time withstand the destructive action of the elements and the chemicals inherent in concrete. The old types of oil base paints have not met these requirements for a concrete paint with the result that experimentation has led to the development of rubber base paints which are proving entirely satisfactory on concrete and other structural materials.

Considerable interest is being currently manifested in the decorative murals now being executed on several buildings constructed for the New York World's Fair next year. These murals are being painted on concrete and the rubber base paint had to be resistant to weather, to alkalis and to fumes, as well as give reasonable assurance that they will stand up for at least two years' wear and maintain their color brilliance for the same length of time. The artist doing many of these murals, Domenico Mortellito, one of the outstanding mural artists of this country, also demanded that the paints have good coverage, ease of application, and ready mixability of colors.

Two years ago Mortellito employed a rubber base paint in painting habitat decorations for elephant, rhinoceros and bird cages at the National Zoological Park in Washington, and found a number of drawbacks in its use. He brought his problems to the Essex Chemical Company and an investigation was launched under the supervision of Norman Engelhart. The present rubber base paints being used by Mortellito and other artists are the result of two years of intensive work. These paints, sold by Essex under the trade name of "Parecco," have a chlorinated rubber base, this ingredient being added to the paint mix in powder form.

In his collaboration with Essex paint chemists, Mortellito prepared a number of plaques in a variety of pictorial designs on different surfaces, each rendered in an entirely different style of technique. As a result of the artist's experiments and of the tests made with these plaques, the Board of Design of the New York World's Fair approved this new painting medium. Furthermore, at a meeting of all artists doing murals for the Fair, the design board suggested the general use of the new paints. It has been determined that the rubber base paints also work admirably when applied on brick, paper, plaster, etc.

Decorative panel painted on concrete with rubber base paint by Domenico Mortellito, mural artist.

Artist Mortellito has this to say with regard to rubber base paints for mural and other decorative purposes: "As an artist and with particular interest in the use of a medium which will meet all requirements, I find that rubber base paints have a number of qualities extremely important to the painter—both young and old. To describe the artistic peculiarities of rubber base paint is to explain that an artist today not only has to paint decorations on the exterior and interior walls of buildings, but must also meet the necessary demands of building trades and architectural specifications. The evolution of rubber base paints was achieved by the necessity and demand for a medium which embodied the composite materials necessary to resist alkali, potassium salts, iron salts, kinetic rays, and to resist expansion and contraction. It must be employed to meet the various techniques used by artists in expressing themselves in the necessary third dimensional quality and the very intricate and subtle manipulation of artistic expression."

During the investigation of rubber base paints referred to above, its uses for purposes other than those mentioned were naturally looked into. As a result of tests it was found that this type of paint is well suited for the protection of property against weathering, corrosion, water, steam, fumes, gas, alkalis, acids and soot. Both clear and pigmented films were tested for insulation value and were found to have especially good dielectric properties, retaining these properties in moist atmospheres.

Tests also indicated that no other film approaches that of a rubber base paint in resistance to acids and alkalis and other corrosive elements so often destructive to oil base paints. Extending the investigations into the field of lacquers resulted in the formulation of rubber base lacquers suitable for use on metal, wood, leather, textiles and paper.

Formulation of the Paint

When formulated properly a rubber base paint will produce a hard, tough, flexible and tenaciously adhesive film. The clear, unpigmented film will break down and become discolored under direct exposure conditions. However, clear films properly plasticized to obtain the necessary flexibility serve many useful purposes indoors. It is in the pigmented product that rubber base paint has found its important field. A wide range of pigments is at the disposal of the paint manufacturer, but considerable care must be exercised in their selection in order to meet specific conditions. Such factors as whether the paint is to be flat or glossy, used indoors or outdoors, for protection against acids or alkalis, and finally compatibility with the plasticizers, resins and vehicle used to obtain the best adhesion, must be borne in mind in the selection of pigments.

Adhesion is one of the most important properties in any coating material, and especially so in rubber base paints. Exceptional adhesion can be imparted to this type of paint by the proper selection of suitable plasticizers. Good adhesion is also attributable to the incorporation of suitable soft resins. In the research conducted by Essex Chemical no one plasticizer gave the desired result, three different plasticizers being incorporated in the rubber base paints now being used by Mortellito and others. For interior use, drying and non-drying oils may be employed for certain purposes. In the main, however, the so-called synthetic chemical plasticizers are superior to all others. As in the case of pigments, selection of the proper plasticizer depends largely on the purpose for which the paint is intended.

Where gums and resins are concerned, the synthetic resins are far more adaptable and compatible with the other ingredients required for the formulation of rubber base paints. These synthetic resins range in form from very hard to liquid resins. Different types, such as phenolics, glyptals, arochlors, coumarones and glycerated resins may be employed, as well as many natural gum resins. The same caution applied to the selection of pigments and plasticizers must be repeated where gums and resins are concerned. Here again it was determined that no single gum gave the desired result to meet some definite requirement. It was also found that extreme caution in selection of the resin was called for in order to make certain that it would be completely compatible with the vehicle composition at all stages during evaporation of the vehicle itself.

In formulating the vehicle, there is a wide range of solvents, latent solvents and non-solvents from which to choose. In most instances, these materials are plentiful and fairly priced. From the three types mentioned, materials to obtain any evaporation range that may be required for any specific purpose can be secured. Naturally, the selection of vehicle composition is important since penetration, brushability and the ability to hold all ingredients in proper solution during the time required for the volatile constituents to evaporate completely depend entirely on the vehicle. The vehicle must possess an agreeable odor and must mix easily with the rubber base paint in case the paint becomes viscous due to evaporation of the vehicle.

Industry and art have received rubber base paints as a welcome addition to the field of protective and decorative coatings. But it is the author's definite opinion, based on the results of actual experimentation and application, that rubber base paints must be "engineered" to meet specific requirements. In any event, rubber base paints have definitely passed from the specialty field to that of general use.

Cement plaques of these panels, one done with transparent paint (left), the other with flat absorbent paint (below), were buried for weeks in the ground and resisted the influence of alkali, potash, etc.

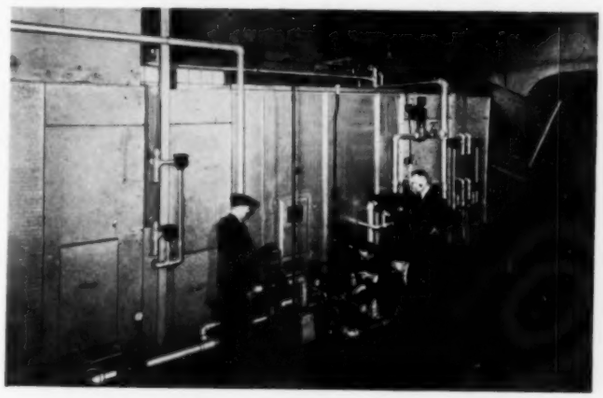
Air Conditioning for the Rubber Glove Factory

Installation of an Air Conditioning System Has Effected Economies and Assured Product Uniformity at Wilson Plant

LINEMEN who handle high tension wires carrying up to 20,000 volts require electricians' gloves which offer complete freedom of movement, yet give positive protection. The production of gloves to meet these standards calls for a manufacturing process which gives assurance of uniformity in the finished product. Because of the steps involved in the manufacture of these gloves temperature and humidity conditions must be carefully gauged, since a temperature change of but a few degrees or humidity conditions of varying percentages can readily ruin a batch of gloves. Fully cognizant of the part played by temperature and humidity in the manufacture of uniform gloves, the Wilson Rubber Company recently took a forward step to assure such uniformity by installing an air conditioning system in its Canton, Ohio, plant.

Electricians' gloves at the Wilson plant are made by the cement process in which crude rubber is dissolved in naphtha to a very thin consistency, porcelain forms being dipped into the solution. Approximately 36 separate dips are required to produce a finished glove equivalent to .055 of an inch in thickness. After each dipping the naphtha content of the solution must be evaporated so that only a thin deposit of rubber remains on the form. Since the evaporation process between dippings takes several hours, it may readily be imagined how changes in temperature and humidity conditions can affect the finished product.

Wilson technicians determined that a temperature of 85° with a relative humidity of 50% constituted an ideal condition in a plant producing electricians' and other gloves. They also determined that a minimum of twelve air changes per hour was necessary in order to carry off the naphtha fumes. To meet these conditions, a combination of blast coils and an air washer, made by the Trane Company, La Crosse, Wisconsin, that conditioned 23,000 c.f.m. of outside air, was installed. A separate exhaust system, with 24 suction lines, each extended to within two feet of the floor, was also constructed. This was necessary to pick up the naphtha fumes which are heavier than air and collect at the floor line. 21,000 c.f.m. of room air is exhausted through this system, the operation of which is entirely automatic, even to the change-over from summer to winter operation. A well on the premises provides 290 g.p.m. of 52° water necessary for peak summer operation.



Assembly of the air conditioning system at the Wilson factory which conditions 23,000 c.f.m. of outside air.

Installation of the air conditioning system is said to enable the Wilson Rubber Company to maintain a definite production schedule, to turn out products which are of uniform construction, and to effect economies due to reduction in the number of rejects.

Close-up showing dipping of one rack, containing 78 forms, of electricians' gloves for handling high tension wires.

View of the dipping room which shows various ducts as well as dipping tanks and form racks with electricians' gloves.

Importance of Colloid Chemistry and Physics

By Dr. Ernst A. Hauser

THERE are few fields of research and branches of industry that can show so many definite colloid chemical and colloid physical phenomena as the rubber industry, which includes the plantation and the production of crude rubber.

Even the basic material, rubber latex, is a typical colloidal system. Its transformation into crepe or smoked sheet depends on the discharge of the separate hydrocarbon particles and on the coagulation into a coherent coagulum. A more practical control of this process on the basis of colloid physical considerations would be valuable for obtaining more uniform crude rubber products.

Various latex concentration processes, such as evaporation by using protective colloids, centrifuging in high speed machines, creaming through addition of hydrophilic colloids, concentration of the hydrocarbon constituents by means of filtration, dialysis or electrodialysis are throughout processes that are known to the colloid chemist. The production of the most different kinds of rubber goods direct from latex by means of regulated coagulation, frothing, etc., depends likewise entirely on colloid chemical phenomena.

But the older processing of crude rubber did not lack problems of colloidal nature. Even when one dismisses the fact that the changes which take place in the colloid "rubber" during mastication, dissolution in organic solvents and in vulcanization include many colloid chemical problems, so must the reciprocal effect of rubber with the various incorporated compounding ingredients be considered as mainly capillary chemical phenomena. Here questions of wetting, surface structure, etc., play leading roles.

The accumulation of these facts, which at any time may be considerably supplemented and enlarged, should suffice to demonstrate the significance of colloid chemistry in the fields of rubber research and technology.

No one, even he who is only somewhat inclined toward progress, will employ a chemist for exclusive organo-chemical work who is a specialist in the field of inorganic chemistry, and vice versa. Colloid chemistry is admittedly an additional branch of general chemistry, but it has grown so ramified today that its comprehension calls for specialized study. Colloid chemistry and physics should be studied in college in order to apply the science practically in the factory. Industries which do not give this circumstance its respective attention will not be able in the long run to keep pace with their progressively-minded competitors.

That the manufacturers of the United States and particularly those in the rubber industry of this country are more and more realizing this condition is all the more noteworthy when one considers that the teaching of colloid chemistry was first introduced into this country at a comparatively late date. To what extent it is accepted nowadays, particularly in the matter of employment in the rubber industry, is shown distinctly by the fact that those students who have specialized in colloid chemistry are the ones who are preferentially engaged.

Resistance of Tires to Skidding

ONE of the reports submitted from the United States to the Eighth International Road Congress held at The Hague on June 19-July 2, 1938, was based on a study and standard of quality of a road surface from the viewpoint of its slipperiness or ruggedness, and its resistance to skidding, as well as for its property of reflecting or absorbing light (under artificial lighting). This report was prepared by R. H. Baldock, chief engineer, Oregon State Highway Commission.

The knowledge of the coefficient of kinetic friction between automobile tires and roadway surfaces now extant is due almost entirely to the work of Professor R. A. Moyer and his associates at Iowa State College. The report prepared by Mr. Baldock deals with the findings of Professor Moyer from numerous tests of the skid-resisting properties of various types of surfaces, plus the reports and observations contributed by various other organizations and individuals.

Included among the general conclusions drawn from the report by Mr. Baldock were the following: (1) The larger of two tires of the same tread design will have the greater coefficient of friction, thus substantiating the theory that the total frictional resistance of tires on road surfaces is equal to the true frictional resistance of the two materials plus the mechanical resistance which increases with the contact area of the tire; (2) On wet surfaces the squeegee action of the edges of new-tread tires provides a more intimate contact with the area of the road surface than is possible with smooth-tread tires and thus reduces the lubricating effect of the water; and (3) As the speed of the vehicle increases, particularly on wet surfaces, the coefficient of friction decreases.

The coefficient of friction in the tests covered in the report is the ratio between the force parallel to the road surface and the normal pressure of the tires upon the road when skidding is impending or actually taking place. If skidding is impending, the coefficient is called the coefficient of static friction, while if the movement is actually taking place the coefficient is called the coefficient of kinetic friction.

In theory, which was substantiated by the tests, the total frictional resistance to skidding is equal to the true frictional resistance between the tire and road surfaces plus the resistance which results from a mechanical interlocking of the tire tread with the road surface. This mechanical resistance is brought about by the interlocking of minute particles of rubber with equally small projections in the road which tend to shear the rubber as the tire slides over the surface.

The true frictional resistance is theoretically proportional to the normal load supported by the tire, while the mechanical resistance is dependent not only on the normal force or load on the tire but depends also on the area of contact of the tire with the road surface. Surfaces which are smooth and which provide a large and intimate contact area for the tire, as indicated by tests, provide the greatest resistance against skidding.

On wet surfaces, the water serves as a lubricant if it cannot be squeezed or squeegeed from the surface as the tire rolls over it. At speeds above 25 m.p.h. the tires fairly skim over the surface. If the water is trapped between the tire and road surface, skidding resistance drops off sharply.

Charles Goodyear

CONNECTICUT YANKEE AND RUBBER PIONEER

By P. W. Barker

CHAPTER VIII.

Goodyear Endeavors to Control Heat

HEAT had engaged the efforts of many men before Charles Goodyear. The ancients thought heat the very essence of life itself, stolen from the gods by Prometheus. Goodyear was to devote three or four important years of his life to experiments with rubber and heat. Chaffee, at the Roxbury Company, and others at the Boston Steam Factory, used steam heat in rubber manufacture before Goodyear did, but where they used heat to dry the solvents (usually turpentine) from the rubber mixture, the inventor used it to bring about a more perfect cure.

Goodyear Moves to Lynn, Mass.

After observing the result of dropping a piece of rubberized cloth on a hot stove, Goodyear wrapped a piece of cloth around his finger and tried the experiment over a candle. Next he used an open fire, but only a small portion of the specimens used ended with the peculiar charred appearance he had previously noted. He now knew that his experiments would require some time for perfection; therefore, he moved his family from Roxbury to Lynn where he might take advantage of the steam power and heat of Baldwin and Haskins, his two friends late of the Roxbury company.

Years later, James McCracken and John McDermott, employees of Baldwin and Haskins, told of the visits made by Goodyear to the Lynn factory. Inasmuch as these two had charge of the boilers, the inventor was with them on numerous occasions. Test specimens were put on top of a boiler (in one experiment inside the boiler itself) and tied by bagging inside the exhaust pipe. McCracken later testified: "He came in after hours, held pieces into the fire on a shovel, and interfered with my work in general." At one time sand was heated in a kettle over a cylinder stove and specimens buried in the hot sand. At another, a pot of hot lead was used.

After a few weeks in Lynn, with only partial success, Goodyear again moved, around the first of May, 1839, this time to East Woburn, to a place known as the Badger house.

The inventor now decided to have a special oven or furnace built in which large specimens could be "fireproofed." One morning in May of 1839, Amasa Goodyear, the aged father, and Nelson Goodyear and Amasa, Jr., the willing brothers, appeared in the yard in back of Hayward's factory in Woburn, equipped with shovels, bars and pickaxes. Daniel Burbank, a bricklayer and mason of Woburn, assisted them in their work.

The finished furnace was 8 feet square, 6 or 7 feet high, and was made of bricks, with a plastered ceiling. A stove was half set into the furnace, with its pipe running around the bottom and out the opposite side. A zinc-covered wooden door was built to retain the heat. Work on the furnace was completed about May 22, 1839. Burbank was not paid immediately, and eventually had to accept part payment in rubber goods.

H. M. Beers, a Woburn shoemaker, spent four weeks making shoes of Goodyear's composition cloth specially for trial in the new furnace. When completed, the entire batch was placed inside the furnace and the fire stoked. The shoes immediately caught fire and were completely destroyed. After three more weeks of labor Beers completed another lot of shoes. This time gradual heat was applied for fear of burning the wooden lasts inside the shoes. On this occasion heat was insufficient for complete vulcanization.

Again Beers labored and produced a third lot of shoes, accompanying their delivery with the suggestion that they be placed inside the furnace on iron slats, with sand inside them instead of wooden lasts. This suggestion was followed and gradual heat applied. The result was the best obtained, although a perfect cure was still a long way off. On another occasion in this series of vulcanization experiments, the furnace door, which was only partly fireproof, caught fire and destroyed the test specimens completely.

Inventor Active While Waiting

Charles Goodyear was not idle during the periods of waiting for new experimental batches of shoes. Far from it. He constantly bothered employees of the saw factory of Richardson & Company to heat his rubberized cloth over their furnaces. These furnaces had to be cooled off to accommodate him. Anyone in the neighborhood having a hot fire was sure to receive a visit from the inventor. And many a cord of wood he lugged home from the open fields to feed his furnace.

NOTE: This biography of Goodyear started in our April, 1938, issue.

From about June, 1839, when the few thousands of dollars received from the sale of his acid gas licenses had been spent, to September, 1841, when he began to receive new support from sponsors, Charles Goodyear lived in Woburn. During this period he touched the very bottom of despair. Rev. Peirce calls this period "The Hour of Trial," and he draws many lessons from it for his readers, chiefly those of perseverance and trust in God. Goodyear did have trust in his God at this time of his life, as well as at all others. He was not a Connecticut Yankee for nothing. He also kept busy while awaiting the break in his ill-fortune which he knew eventually would come to him.

Years later, his neighbors in Woburn told of this "Hour of Trial", of his aged father borrowing small things with tears in his eyes—a wheelbarrow of firewood, a quart of meal, a cup of sugar, a mess of potatoes. Goodyear also borrowed, until his credit ran out. He pawned everything possible; even sold his children's school books. He fished the streams for turtles and bull frogs until it seemed he was more fisherman than rubber manufacturer. O. B. Coolidge, late of the Eagle company, was one of the few to assist him at this period, and the good deed probably saved the name of the donor from obscurity.

Despite Goodyear's failure to keep his contract of September 17, 1838, with Nathaniel Hayward, under which he was to pay him $800 per year and use his factory, Hayward again entered Goodyear's employ. A new contract was drawn for one year duration, dated April 3, 1841, providing for a monthly salary of $50, to manufacture and experiment in rubber. This contract appears to have been kept by both parties, although many years later Hayward claimed that he was not paid in full for his services. Hayward, it is believed, did not always tell Goodyear the full results of his discoveries, and there is record of his performing experiments secretly, whereas Goodyear took his employee into his confidence regarding all experiments. These two men remained exceptionally good friends, considering the circumstances.

A harrowing experience is related by Goodyear of a trip made to Boston on foot to borrow some promised money needed to keep the family in food. Complete failure and a hurried return home in 1840 to assist at the burial of a young son, William Henry, was the result of this trip. Owing to their extreme poverty, the bereaved family followed the body to the cemetery on foot.

About this time a major calamity struck. It appears that Amasa, Sr., accompanied by Amasa, Jr., his wife, and daughter Harriet, aged 3, had journeyed to Florida to be among the first to raise fruit for the northern market. Yellow fever was spreading at that time and many parts of the South were veritable pest holes. The four venturesome Goodyears all contracted the disease and died: Amasa, Jr., on July 1, 1841, at Key West; Mrs. Amasa, Jr., on August 7, at Indian Keys; little Harriet, August 15, at Indian Keys; and Amasa, Sr., the father of the inventor, on August 19.

How these poverty-stricken people ever got to Florida will probably always remain a mystery. It requires no imagination to understand the grief that was Charles Goodyear's at the news of this latest misfortune. He was so deeply hurt that he omitted all reference to this calamity when detailing events during his time of trial.

Debtors' Prison, Boston, Mass.
April 21, 1840

Gentlemen:

I have the pleasure to invite you to call and see me at my lodgings on matters of business, and to communicate with my family, and possibly to establish an Indian rubber factory for myself on the spot. Do not fail to call on the receipt of this, as I feel some anxiety on the account of my family. My father will probably arrange my affairs in relation to this hotel, *which after all, is perhaps as good a resting-place* as any this side of the grave.

CHARLES GOODYEAR

NOTE: Letter believed to have been addressed to Luke Baldwin and John Haskins.

Rubber Coat of Many Colors

During his experiments on the effect of heat on rubber in Woburn, Goodyear managed to vulcanize enough material to make a long overcoat for himself. Originally drab in color, it soon had as many brown spots as the coat of a leopard. It was the inventor's custom to wear this coat into Boston and other towns to demonstrate the practicability of rubber clothing and the ability of his goods to withstand the fire test. Holding the coat near a hot stove or over an open flame merely discolored it, and was claimed to be absolute evidence of its "fireproof" nature. Each new demonstration meant another spot. Many were the pranks played upon this poor man and his "coat of many colors" by unbelievers. With the patience of Job, Goodyear repeated his demonstration at any and all possible opportunities. According to Hayward, the coat was pawned at least once to a conductor of a railway train to pay for a trip from Boston to Woburn.

On one trip to Boston with Hayward in April, 1840, Goodyear was taken by an officer and imprisoned for debt. Hayward visited him the next day, bringing a rubber bed, a number of "fireproof" rubber samples, and $2 in cash.

James Dyer, selling agent in Boston for the Roxbury company, reports of a visit from Goodyear in 1839 or 1840. Goodyear was poorly clad. The inventor had samples of his "fireproof" gum which he tested on the stove. Dyer says that he was on poor terms with Goodyear at the time, and that it is quite possible that he threw his visitor into the street.

When all his luck appeared to be only of the worst variety, Goodyear received $50 from his brother-in-law, William C. De Forest, to whom he had written an appeal for funds. This loan was important in that it enabled the inventor to travel to New York to explain his invention and exhibit his specimens to William Rider, and his brother, Emory. For a year the Riders financed Goodyear's experiments and supported his family. By the end of 1841, however, the Rider brothers withdrew their support from Goodyear, an action compelled by heavy losses suffered from other investments.

In the meantime, the surviving pieces of the Goodyear family's furniture had been moved to the home of William Beers in Woburn, about August, 1840, and the family had gone to board with Elizabeth Emerson in the same town. Even after the Riders had withdrawn monetary support, the family continued to live at the Emerson home, continuing their stay to September, 1842. For almost a year prior to this date, Charles Goodyear had been in Springfield, Mass., experimenting with his "fireproof" gum.

On page 127 of his *Gum Elastic,* the inventor states that his first real success at vulcanizing large sheets of rubberized fabric was effected in Springfield in the fall of 1841. This was done by passing the sheets through a heated cast iron trough. The trough was made in the form of a box, without a top. It was 3 feet long, 1½ feet high, 1½ feet wide at the top, and 1 foot wide at the bottom, and was set on a brick furnace. At each end of the trough was a roller over which the fabric to be vulcanized was placed in an endless belt arrangement. Means of operation was supplied by a crank turned by waterpower, assuring somewhat even heating. Daniel Burbank, who had assisted in the construction of Goodyear's first brick furnace at Woburn, built the new furnace and trough at Springfield. This was in April of 1842.

Goodyear was so pleased with the success of his trough, that he wrote his old friend John Haskins to visit him. Sometime in 1843 the reel fell down and goods being treated were burned. An upright (or vertical) heater, built like a chimney, from basement to second floor, replaced it. Waterpower was used to turn the new iron reel.

Haskins reports that in the winter of 1842 he saw fair samples of coats, capes and shirred goods, but that it was not until the summer of 1843 that he was entirely satisfied with Goodyear's "fireproof" fabrics. At that time, he received a piece of cloth of some 20 to 30 yard length that was heated well throughout. The cloth came from Goodyear's Springfield works. The inventor was so excited with this report that he wanted to make a dress to be sent to Queen Victoria in England.

Hayward says that in 1843 Goodyear carried on his experiments in Springfield, Northampton, Roxbury, and Lynn, manufacturing quite a variety of articles. Henry Bateman Goodyear, a brother, was in charge of the Springfield works from November, 1842, until July, 1844, with Nelson, another brother, acting as his assistant.

Old debts accruing from earlier failures caught up with the inventor and he was confined to the limits of the debtors' prison in Springfield. While incarcerated, a tailor delivered a suit of clothes he had completed for Goodyear, indicating him to be at least a trusting soul, or an accurate judge of human character. The boy who actually delivered the suit gave the prisoner a large apple of his own free will. This good deed was to bear fruit for the youth when grown to manhood. In 1855 he visited the Universal Exposition in Paris. Goodyear, who was exhibiting there, recognized him and remembering the incident of the apple rewarded him with a ride in the carriage of the Emperor down the Bois de Boulogne. They were the only ones who drove that day behind four horses.

Debts Paid Out of First Profits

Upon being released from the Springfield prison, Goodyear finally took advantage of the bankruptcy laws and thus his Springfield experience was the last in prisons in the United States. Although his legal obligations to creditors were adjusted, the moral obligations preyed on Goodyear's mind, and he soon paid all of his debts, amounting to some $35,000. These debts were paid out of the first profits from his discovery of vulcanization.

Close by Goodyear's factory in Springfield was the smaller rubber plant of Cutler & Warner, run by Horace Cutler and Solomon C. Warner. These two had purchased the right from Goodyear to use his methods for manufacturing shoes, suspenders, trusses, umbrella tops, vest springs, and other elastic goods. All products they made were marked "Goodyear's Patent." Cutler is one of the few persons who worked with rubber during these times whose personal appearance is mentioned: "About 5 feet, 3 inches, weight 118 pounds, sandy hair and whiskers, Roman nose, pretty much of a fop in general appearance."

New Haven, Decem. 15/40

Friend William:

I have succeeded in making a sale of $50 and shall not want more money before I get to Boston. By the 25th I shall feel obliged if you will authorize me to draw on some person here at sight or a few days sight for a part, say $75, or remit me a Draft (City Bank draws on Boston) and at the same time allow me to draw at 30 days for the difference if I want.

I suspect I am quite as able to pay you the $100 as you are to lie out of it but as my own money is not zackly my own, but India Rubbers, I will feel obliged to you for your Indulgence in that, and request you to make all your charges of damage to that Mighty Elastic Substance.

I am truly yours,

CHARLES GOODYEAR

You will do me a favor if you will give me the size of your waggon cloth by first mail to Northampton. I want a new article put to the severest test for that purpose.

Early in December, 1842, Cutler consigned 95 pairs of overshoes, made of rubberized buffalo skins, to Horace H. Day, in New York, for which he later received $26.75 for those sold. On December 3, 1842, Day, whose factory was in New Brunswick, New Jersey, addressed a letter to J. W. H. (Horace) Cutler, of Springfield, Mass., extending an invitation to him to visit the Day store at 45 Maiden Lane in New York City. The letter also suggested that Cutler bring along samples, and further stated, "I wish to know if you can cut the rubber thread which G. uses for suspenders. He says it is spun."

Cutler did visit Day, arriving in New York on December 17, 1842. Day then persuaded Cutler to go to New Brunswick to teach the Goodyear processes, including the heating of rubber, to his employees, at a stipulation of $30 per month. Cutler later testified: "I explained to Day that Charles Goodyear had obtained a *caveat of patent* for heating rubber goods and that he would be subject to suit if he used the method. I then gave Day a written memorandum on Charles Goodyear's method of compounding with white lead (he asked me if it was the same as painters' use), sulphur, rubber, and heating. He gave me his note for 60 days, for $66, and some cents to pay for board and return ticket to Springfield."

In the summer of 1843 Day visited the Goodyear factory at Springfield, and although the inventor did not admit him to the actual works, he did talk with him for some time. The entrance of Horace H. Day into the affairs of Charles Goodyear was to mean trouble for the patient inventor who had already suffered for eight long years before enjoying the partial success which was now his.

(To Be Continued)

Hard Rubber as a Plastic Material

ALTHOUGH bitumen can lay claim to being the first natural raw material used for plastic purposes, its use in modern times has been somewhat limited. For this reason hard rubber (or ebonite, as it is often termed) is entitled to the claim of being the first of the widely used modern plastic materials, according to an article on "Modified Plastics," by Gustavus J. Esselen and Walter M. Scott in a recent issue of *Chemical Industries*.

As early as the middle of the 19th century it was found that the demand for electrical insulation equipment could best be filled by rubber, and in 1854, O. Mayer in Germany laid the foundation of the use of vulcanized rubber as a molding material. Rubber has been superseded by the newer plastics for many purposes, according to the authors, and although the demand for molded articles for electrical equipment and for other purposes has increased many fold, the amount of rubber used in this way has remained almost stationary.

Molding Technique Unchanged

The hard rubber molding technique has remained virtually unchanged since 1909, the article states, and this lack of improvement in the rubber plastics industry is probably one reason why production has not increased appreciably. Another reason is said to be the difficulty of compounding rubber, in comparison with most of the other plastics. Rubber plastics have been used for many years for the production of distributors and distributor heads, for the high tension ignition gear in internal combustion engines, for storage battery cases, and for other electrical equipment.

Although rubber itself is not adapted to the production of molding powders, the authors point out that it can be modified by chemical reaction into forms which can be powdered and are more suitable for molding than raw rubber. The oldest of these derivatives, of course, is chlorinated rubber, the first patent for which goes back to 1859 in England. Commercial development, however, is comparatively recent, having started in Germany about fifteen years ago.

Plastics obtained from chlorinated rubber alone, or in conjunction with fillers, can be molded into machinable products. Chlorinated rubber is compatible with Bakelite in all proportions. Mixtures containing up to 50% of the rubber can be freed from solvent and powdered. Mixtures containing over 50% of the rubber can be disintegrated but not powdered.

Various Rubber Derivatives

The article also makes mention of the fact that thermoplastic materials can be formed when rubber is acted upon by halides of amphoteric metals, such as tin. Commercial development of these chlorostannic rubber derivatives is centered in the United States, and dates back to about 1930. These derivatives are said to be highly resistant to acids, alkalis and moisture, and to have excellent electrical properties, and to have less cold-flow than cellulose acetate. They are capable of being colored.

In concluding references to rubber as a molding material in their article, the authors mention the fact that the development of chlorinated rubber has been followed by the development of oxidized rubber. Sulfonated rubber is also suitable for molding, and rubber hydrochloride has been used for the manufacture of transparent sheeting. Hydrogenated rubber, called hydrorubber, has also been suggested for use in laminated glass and as an insulation for submarine cables.

Freezing and Melting of Rubber

WHEN crude rubber is stored during cold weather it frequently loses its resiliency and becomes hard and opaque. If it is tightly compressed when baled for shipment similar changes occur. The rubber is said to be "frozen" or "boardy." These changes in physical properties are caused by crystallization. The crystals melt when the rubber is warmed, and then the normal resilient properties are restored.

In the course of recent work by W. Harold Smith and Charles Proffer Saylor in the laboratories of the National Bureau of Standards, specimens of *Hevea brasiliensis*, and of its sol and gel fractions, were crystallized at a suitably low temperature. In some cases the specimens were crystallized under conditions of stress. Microtome sections were then prepared and examined at controlled temperatures under a polarizing microscope.

As reported in the September, 1938, issue of the *Journal of Research*, published by the Bureau, when unstrained rubber was studied in this way, each section appeared to be composed entirely of irregular, strongly birefringent, crystalline particles exhibiting no systematic orientation with respect to each other. The crystalline rubber usually melted between 5° and 16° C., a range which was similar to that observed previously with discrete crystals of rubber which had been prepared from solution. In the case of the frozen specimens, however, the temperatures through which melting occurred were not the same in different pieces of frozen rubber, even when they had been prepared from the same material and frozen simultaneously. The crystals in adjacent microtome sections cut from any piece of frozen rubber melted alike, but crystals in sections from widely separated parts of the same piece sometimes exhibited real differences.

When rubber was frozen while strained, crystalline groups tended to be oriented with their high refractive indices parallel to axes of elongation. A curious consequence of this was observed in strips of rubber which were stretched and then frozen. As freezing progressed, the continuing orientation of rubber molecules caused the strips to elongate about 4 per cent beyond the length previously attained by the stretching. The melting temperatures of strained frozen rubber did not greatly differ from those of unstrained rubber, although they may have been slightly lower.

When rubber was "frozen" under pressure, the melting points of its crystals were higher than those determined without pressure, melting being not below 33° C. Vulcanized rubber did not crystallize at the temperatures used to produce crystals in unvulcanized rubber, but when lightly vulcanized rubber was stretched before being subjected to low temperatures, notable amounts of "freezing" occurred.

Obtaining Rubber by Freezing

AN interesting method of obtaining rubber in concentrated form by partially freezing latex is revealed in U. S. Patent No. 2,131,333 recently awarded to Hans Dietrich Graf von Schweinitz of Frankfort-on-the-Main-Hochst, Germany. According to the patent, the rubber hydrocarbons in the latex are partly frozen. Ice crystals are then skimmed off and the liquid portion remaining is said to contain highly concentrated rubber. Apparently partial freezing overcomes any harm brought about by complete freezing.

An index to Volume 43 of THE RUBBER AGE will be found facing page 60 of this issue.

Establishes American Crude Rubber Development Bureau

Domestic Bureau, Initiated by British Interests, Will Function Under the Directorship of Warren S. Lockwood

THE Crude Rubber Development Bureau was opened on October 1, 1938, with offices in the Munsey Building, Washington, D. C., by rubber producing interests as a part of the program outlined under Article 19 of the International Rubber Regulation Agreement of May, 1934, to further research into and publicity for new and increasingly important uses of rubber. Mr. Warren S. Lockwood, formerly American Assistant Trade Commissioner in Singapore, Batavia and London, has been appointed director.

It will be recalled that the proposals contemplated under the 1934 scheme have resulted in the establishment on an international basis of producer organizations to cooperate with rubber manufacturers everywhere in increasing consumption of the crude product by developing the demand for, and enlarging the effective range of, the industry's varied output.

For this purpose the International Rubber Research Board and the International Rubber Propaganda Committee, composed of English, Dutch and French delegations, have been set up, and permanent organizations founded in England, Holland and France—The Rubber Foundation, Amsterdam, the Institut Francais Du Caoutchouc, Paris, and the British Rubber Producers' Research Association and the British Rubber Publicity Association, London. The excellent work of these organizations is well known to the rubber industry in this country.

Initiated by British Association

The Crude Rubber Development Bureau was initiated by the British Rubber Publicity Association to carry out a program in the United States similar to that which has been developed during the past year in England and Empire countries. In view of the rapidly enlarging scope of the rubber industry, the new Bureau aims for the first year at least to concentrate its activities on the obvious advantages, yet only recent adaptations, of large scale uses for rubber in agriculture.

Mr. Lockwood, director of the new organization, has spent the past two months travelling in Great Britain, Germany, Czechoslovakia, France and the Netherlands studying the extent of the movement in those countries toward the goal of all agricultural wheels rolling on rubber, and has contacted manufacturers, universities, government and trade officials from whom data on latest developments abroad will be secured.

Material will be received also from the British, Dutch and French research and publicity organizations set up under the International Agreement. Periodic releases of this material will be distributed in trade press, pamphlet or letter form to interested American manufacturers, associations and agricultural colleges.

Constant contact will be established by the Bureau with agricultural universities, research bodies and farm trade organizations in this country so that an informational service can be maintained for rubber and equipment manufacturers which can supplement, or serve as verifications of, the data secured by individual firms.

Warren S. Lockwood

Director of the Crude Rubber Development Bureau Established in U. S.

The Crude Rubber Development Bureau will act as a liaison between rubber manufacturers and tractor and implement concerns so that matters of mutual advantage can be placed on a cooperative basis. The Bureau will collect also non-confidential information from government offices of developments of common concern to rubber firms engaged in farm equipment business and will attempt to further the interest of government and trade organizations in such vital problems as standardization of wheel sizes and inclusive farm census coverage.

Articles will be featured in national and trade publications stressing the advantages of rubber tires on tractors, farm implements and wagons, and educational activities will be carried on through the publication and distribution of pamphlets, through lectures before colleges and farm organizations, and occasionally through exhibits at fairs, motion pictures and radio talks.

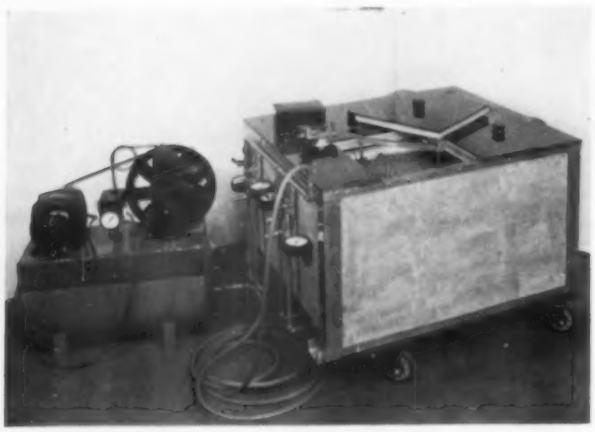
Periodic Bulletins Will Be Released

The Director, Mr. Lockwood, has for the past nine years been associated with the foreign service of the Bureau of Foreign and Domestic Commerce in the Far East and in Great Britain. He will be established in Washington from November 1, following several weeks of preliminary visits to rubber and farm equipment manufacturing centers in New York, Akron and Chicago, as well as to a number of the leading agricultural colleges. Periodic bulletins will be released without charge beginning January first.

New Equipment

Air Bomb Testing Apparatus

NEW apparatus for the testing of rubber for resistance to aging by the air bomb method, for which certain advantages are claimed when compared with the oxygen bomb method, has been designed and built by the Electrical Testing Laboratories, New York



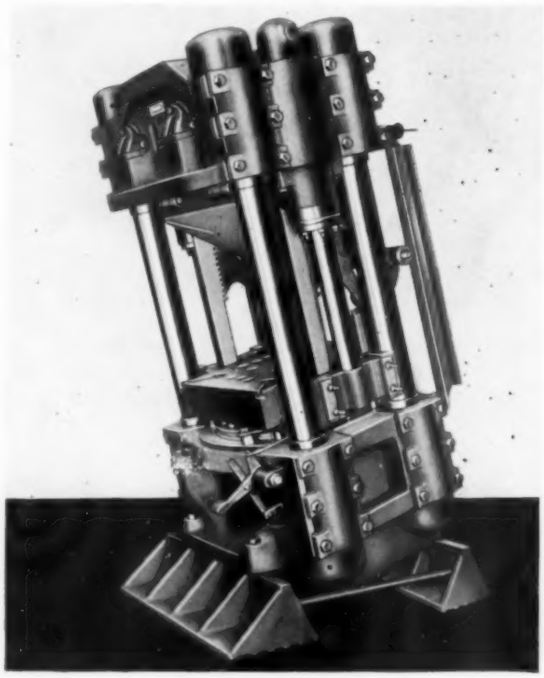
City. Advantages claimed include the following: ordinary air can be used in the new apparatus instead of oxygen; test pressure is much lower; and at the higher test temperature the test period takes only five hours as compared to 48 to 96 hours for the oxygen bomb method. At present the air bomb method is recommended for use only with compounds specially prepared to withstand high temperature operation, although there is a strong tendency to use it for all grades of rubber. Specifications now require that the air pressure shall be maintained at 8 pounds per square inch with a temperature of 127° C. for five hours. The apparatus consists of four bombs since specifications limit the number of specimens which may be tested simultaneously and prohibit the testing of more than one kind of rubber in a bomb at one time. A circulating air system, involving a small blower, electric heater and thermostat, supplies the desired temperature. Each bomb is provided with a cut-off valve, pressure relief valve and a gauge. Temperature within each bomb is measured with calibrated copper-advance thermocouples. Chromium plating of parts is used to forestall corrosion. Air at the desired pressure is furnished by a small motor-driven compressor with automatic controls.

Direct Set Indicating Controllers

TWO new direct set indicating controllers, one for temperature (Model 9-TIC) and one for pressure (Model 9-PIC), have been developed by the C. J. Tagliabue Manufacturing Co., Brooklyn, N. Y. The instruments incorporate all of the latest developments sponsored by the manufacturer, including the interchangeable calibrated tube system, safety link for range protection, pointer arm brackets with bearings at each end, and all important parts of stainless steel. They can be supplied in both "on-off" or "throttling" types. The "on-off" controller opens the diaphragm valve if the temperature is slightly below the setting point and will close the valve if the temperature rises slightly above that point, while the "throttling" controller is identical in design to the other with the exception of the use of a flapper mechanism which provides a convenient and exacting sensitivity adjustment from hairline to 100% throttling range. A feature of the direct set instruments is that both the white control pointer and the red setting pointer indicate on the 5½-inch graduated scale, offering a clear, direct reading for checking control performance.

Inclined Hydraulic Molding Press

A NEW 1,000-ton inclined hydraulic molding press, which provides accessibility to the molds for cleaning and recharging without removal, has been introduced by the Farrel-Birmingham Company, Ansonia, Conn. According to the manufacturer, the new press not only makes cleaning and recharging quicker, but enables this operation to be done with lighter labor than when heavy molds must be handled, in addition to which the molds lose less heat by radiation and the time cycle is reduced. The press can be operated on existing hydraulic high pressure lines or combined with self-contained pump and motor with oil pressure system. In either case it can be provided with a time cycle control so that the curing period is controlled when operated in a battery of presses. The lower platen of the press is inclined at such an angle that easy reach is permitted to the rear edge of 40-inch molds. A knockout device engages the pin plate of the bolster and ejects the finished articles. To allow recharging of the cavities the knockout device is disengaged by a foot lever. Ejection force and quick opening are provided for by push-down rams of 40-ton capacity. When the press opens the upper platen is



lowered at the rear, making it accessible for cleaning and removing vagrant flash. There is sufficient space for two attendants to refill multiple cavity molds simultaneously. Registry of the two halves of the mold is assured by "T" slots in the platens which enable the bolsters to be bolted in adjustable positions.

Book Reviews

Trade Associations in Law and Business. By Benjamin S. Kirsh (in collaboration with Harold Roland Shapiro). Published by Central Book Co., 245 Broadway, New York City. 6 x 9 in. 400 pp. $5.00.

The strength and weaknesses of the trade association movement, and how these factors affect the industries which are represented by the respective association, are fully and clearly outlined in this book. Although it does not directly embrace the law in its application to mergers and consolidations, the book is concerned primarily with the legal and economic problems arising from the federation of independent units. Leading decisions of the federal and state courts, articles in the law reviews, economic and business journals, numerous addresses and reports are analyzed. In view of the work laid down for the Temporary National Economic Committee, popularly termed the Monopoly Inquiry, this book is of practical value to business executives in general.

•

Minerals Yearbook—1938. Compiled under the supervision of H. Herbert Hughes. Published by Bureau of Mines, United States Department of the Interior. 6x9 in. 1340 pp. $2.00. (Obtainable only from the Superintendent of Documents, Washington, D. C.)

Representing the only official record of its kind in the United States, this latest edition of the Minerals Yearbook presents an economic and statistical review of developments in the mineral industry during 1937. It serves to carry forward the annual surveys of mining activities in this country that were inaugurated more than 70 years ago and have been published continuously for nearly 60 years. The book is divided in four sections: Survey of the Mining Industries; Metals; Non-Metals; and Mine Safety. In the section on non-metals is included data on barytes and barium products, carbon black, clays, magnesite and other magnesium compounds, sulfur and pyrites, and talc. It is replete with statistical tables and has 91 illustrations.

•

Davison's Textile Blue Book—1938. Davison Publishing Co., Ridgewood, N. J. 6½ x 9 in. Office Edition, 1500 pp. —$7.50. Handy Edition, 1400 pp.—$5.00.

The Office Edition of this annual directory, now in its 73rd year, contains data on cotton, woolen, silk, rayon, jute and linen manufacturers; dyers, bleachers and print works; sanforizers; commission merchants; converters and brokers; yarn, cotton, waste and linter dealers; cotton warehouses and compresses; wool, rag and mill remnant dealers; raw, thrown, spun silk and rayon dealers, in addition to a classified directory of cotton and woolen mills and a buyer's guide to textile supplies. The Handy Edition contains all of the above data with the exception of the classified directory of cotton and woolen mills and the buyer's guide to textile supplies. There is also a Salesmen's Directory, which sells for $4.00, but which contains data on mills, dyers, finishers and bleachers only. These directories are complete in detail, brought up-to-date in all particulars, and are invaluable to companies and individuals with interests in the textile industry.

•

Power Requirements in Electrochemical, Electrometallurgical, and Allied Industries. Published by the Federal Power Commission, Washington, D. C. 9 x 11½ in. 125 pp. $1.00.

The more important results of the investigation made by the Federal Power Commission to determine the past and present use of electric power in the electroprocessing industries, and the probable effect of the development of new processes, new products, and economic trends of the future power requirements of these industries, are incorporated in this report. The investigation covered the principal industries using electric power primarily for electrolysis and for heat. Maps are included to show the location of existing plants with respect to raw materials, markets, and present or potential power sources. The report is replete with tables and interesting illustrations, and should prove of value to all electrical engineers.

Booklets, Catalogs, etc.

Sponge Rubber. Naugatuck Chemical Division of U. S. Rubber Products, Inc., 1790 Broadway, New York City. 9x11½ in. 10 pp.

Various processes for the manufacture of sponge rubber are explained in this bulletin, from the choice and preparation of crude rubber through to the curing stages. Recommendations are made for the selection of such compounding ingredients as blowing agents, softeners and fillers, while the advantages of the company's miscellaneous accelerators and antioxidants are stressed. The bulletin includes recommended formulas for fast curing fine blown sponge and for medium cure sponge. Formulas including the use of reclaim are also given, as is also a recipe and procedure which has been found satisfactory for the manufacture of sponge balls.

•

Operators Handbook (1938 Edition). B. F. Goodrich Co., Akron, Ohio. 3¾x6½ in. 68 pp.

This latest edition of the annual handbook on truck, bus, farm and industrial tractor tires issued by Goodrich includes for the first time a table on the effect of load and speed on tire service. As usual, the handbook is replete with statistical material of interest to operators of commercial vehicles of all kinds. An interesting section in this edition is that discussing how to prevent truck tire failures, including the heat-speed problem.

•

Tag Indicating Controllers. (Bulletin No. 1175). C. J. Tagliabue Mfg. Co., Park and Nostrand Avenues, Brooklyn, N. Y. 8½ x 11 in. 4 pp.

Two of the latest indicating controllers introduced by the company, Model No. 9-TIC for temperature and Model No. 9-PIC for pressure, are described in this bulletin, with diagrammatic drawings serving to indicate the construction of the instruments. Complete specifications of both new models are given.

•

Lake Erie Hydraulic Presses. (Bulletin 138). Lake Erie Engineering Corp., Buffalo, N. Y. 8½ x 11 in. 4 pp.

Several examples of the adaptability and economy of hydraulic presses made by the company for limited as well as larger production in the metal working industry are given in this bulletin. Savings due to inexpensive dies, general utility for volume and semi-production output, and lower assembly costs are stressed.

•

Wilbow Rubber Plumbing Specialties. (Catalog 39). Williams-Bowman Rubber Co., Cicero, Illinois. 8½ x 11 in. 40 pp.

Complete factual data, arranged in practical and convenient form with illustrations, descriptions, list prices, weights and other pertinent information on the plumbing specialties manufactured by the company, is given in this catalog. An index to products is included.

•

Thwing-Albert Instruments. (Bulletin M-382). Thwing-Albert Instrument Co., 3339 Lancaster Ave., Philadelphia, Penna. 8 x 10½ in. 4 pp.

Indicating and recording types of instruments for measuring and controlling temperatures encountered in general industry, and physical testing instruments for testing paper, are illustrated and briefly described in this new bulletin. Advantages and special features of the instruments are indicated.

•

pH Testing by the Indicator Strip Method. Pfaltz & Bauer, Inc., Empire State Bldg., New York City. 4 x 9½ in.

This booklet contains informative data on the Wulff pH Tester (indicator strip method). Development, uses and advantages are explained. Prices are given. This tester is particularly useful for accurate work with small or large quantities of highly colored, turbid, viscous mediums containing suspended matter, including latex dispersions.

Editorial Comment

Another Investigation

WITHIN the next few weeks the investigation of domestic monopolies authorized by the last Congress, which is in the hands of the Temporary National Economic Committee, will get under way. Although the movements of the Committee are shrouded in secrecy and no word has been uttered on the subject, there can be little doubt that the rubber industry will be among the major industries, including steel, glass, cement and building supplies, to be probed early in the investigation. Six Federal agencies, including the Department of Justice, are cooperating with members of Congress in the investigation.

The reason why it is a foregone conclusion that the rubber industry will come under the microscope of the "Monopoly Inquiry," as it is popularly termed, is that severe differences have existed between the manufacturers of tires and other products and various Government agencies in the past few years.

Chief among such differences, were the charges made by the Federal Trade Commission against Goodyear relevant to its contract with Sears, Roebuck and Company, the legal reverberations of which have not yet ceased, and the more recent charge of "collusive bidding" made by the Department of Justice against a large group of tire manufacturers.

It will be remembered that in the latter instance the Government went so far as to ask Sears, Roebuck and Company to bid on its tire requirements, and placed an order with the mail order house, setting a precedent in this respect. There have also been other differences between the industry and government agencies in the past.

The Department of Justice is strongly emphasizing the fact that in launching the "Monopoly Inquiry" there is no intent to seek evidence for prosecution, but that its purpose is rather to serve as a guidepost to new legislation. Chairman Joseph C. O'Mahoney of the investigating committee has also publicly stated that the purpose of the study is not punitive but is intended "to draw a broad picture of how America's economic machine operates and what it's all about."

One major function of the far-flung investigation, for which $500,000 has been appropriated, although it is safe to state additional half-million dollar appropriations will be needed before it is concluded, will be a study of patents in relation to monopolies. It is understood that the steel industry especially will be scrutinized in this connection, as will other major industries.

Like other Government investigations under the present Administration, there can be little doubt that industry in general may expect further regulation legislation when the study is completed.

•

Progress of Retreading

IF the figures and estimates given in a recent issue of *Business Week* on the present and future status of the tire retreading industry are substantially correct, then the tire manufacturer has another major problem to contend with, along with those which have kept him company through the years. According to the article, retreads are currently absorbing 5% of the replacement tire trade for passenger cars and approximately 20% of the truck tire business. It is estimated that 4,500,000 tires will be retreaded this year. This represents a gain of 1,000,000 over those retreaded in 1937.

That the tire fraternity recognizes the rapid expansion of the retreading industry is seen from the fact that many manufacturers have begun the production of camelback. Of the 33,000,000 pounds of camelback expected to be produced this year, approximately 25,000,000 pounds will emanate from tire factories. This is truly a paradox. Tire manufacturers are supplying the major portion of the chief material needed for retreading or recapping, supplying an industry which is breaking into their own markets. But then again, if they didn't, others would. It's a vicious circle.

CURRENT • NEWS
of the Rubber Industry

OCTOBER, 1938

Four Papers Are Delivered at Rubber Symposium Held at Providence, Rhode Island, on October 5

Messrs. Geer, Bridgwater, Kimmich and Haushalter Give Papers at Symposium Held Under Auspices of the Newly-Organized Committee on Rubber and Plastics of A.S.M.E.

APPROXIMATELY forty members and guests of the American Society of Mechanical Engineers, including a number of prominent rubber technologists, attended the Symposium on Rubber, held under the auspices of the newly-organized Committee on Rubber and Plastics of the Process Industries Division of the Society, at the Providence-Biltmore Hotel, Providence, R. I., on October 5, in conjunction with the Society's Fall Meeting. The Symposium was held in two sessions, morning and afternoon, with two papers delivered at each session, Felix L. Yerzley, of Du Pont, is chairman of the Committee on Rubber and Plastics.

Four papers in all comprised the Symposium. These were: "The History of Rubber as an Engineering Material," by William C. Geer (of Ithaca, N. Y.); "Synthetic Substances with Rubber-Like Properties," by Ernest R. Bridgwater (Manager, Rubber Chemicals Division, E. I. du Pont de Nemours & Company); "Production Processes and Problems in the Rubber Industry," by E. G. Kimmich (Development Engineer, Goodyear Tire & Rubber Company); and "The Mechanical Characteristics of Rubber," by F. L. Haushalter (Development Engineer, New Products Department, B. F. Goodrich Company).

Two Papers Already Published

The papers by Dr. Geer and Mr. Bridgwater were delivered at the morning session, at which Mr. Alton C. Chick, of the Manufacturers Fire Insurance Company, was chairman. Owing to the absence of Dr. Geer, due to a slight ailment, his paper was read by Chairman Yerzley. The other two papers were delivered at the afternoon session, at which Mr. James Orr, of U. S. Rubber Products, Inc., acted as chairman.

Dr. Geer's paper, in which he covered the high points of the history of rubber compounding with the especial object of showing why it has been possible only within recent years to use rubber as an engineering material, and why today it is possible to manufacture and use rubber successfully in a structure as a component part upon which the essential performance depends, was published in our previous issue. Mr. Bridgwater's paper, pointing out the rubber-like properties of a number of synthetic substances, is reproduced elsewhere in this issue. Interesting comments on these papers were made by S. M. Martin (Thiokol), B. Mullaly (Advance Solvents), E. G. Kimmich (Goodyear), A. R. Kemp (Bell Telephone Laboratories), and others. Mr. Bridgwater also commented on Dr. Geer's paper.

In the paper on "Production Processes and Problems in the Rubber Industry," Mr. Kimmich explained that rubber, in the usual meaning of the word, is not a single substance, but rather a variety of materials with differing properties. This phenomena, he said, explains the vast field for the use of rubber and the multiplicity of processing methods employed in the industry. He then went on to point out how the characteristics of rubber can be changed through a wide range by compounding, vulcanizing, etc.

Mr. Kimmich then described a number of processes used in the industry, particularly those used for the manufacture of molded items, tires and tubes, belts, hose, packing, tank lining and cellular rubber. In general terms he told how rubber goods are fabricated and pointed out some of the problems involved in their manufacture, indicating at the same time with pertinent examples that the product of the rubber industry has few limits as to size or utility other than those imposed by purely economic considerations.

In concluding his paper, Mr. Kimmich said that the rate at which new uses, processes, compounds and rubber-like synthetic materials have been developed in the past serves as an indicator of the rubber industry's greater scope of application in the future.

Some of the characteristics of rubber in which engineers may be interested from a design standpoint were given by Mr. Haushalter in his paper on "The Mechanical Characteristics of Rubber," although he did not go into detail on every phase of the subject which might effect design. He pointed out that there is a vast amount of data still to be collected, especially to establish accuracy on some points which seem to be in doubt, before rubber can be completely accepted as an engineering material, and suggested that it will be necessary to conduct tests in rooms where humidity and temperature are closely controlled to obtain such accurate data.

In this latter respect, the Goodrich engineer said that the accuracy of tests to determine the moduli of elasticity and the creep of shear and torsion springs are very decidedly affected by the temperature because of the Joule effect. He also said that the previous history of a spring, as to the number of loadings to which it has been subjected, must always be considered in analyzing results.

Urges Extensive Use of Rubber

Pointing out that rubber is used but little in tension by engineers, Mr. Haushalter said that there is no good reason for not using it extensively now that rubber can be bonded securely to metal. Rubber can be used safely in tensions up to 30 to 40 pounds per square inch, and when working in this region of elongation the modulus of elasticity is very nearly constant within this range.

In concluding his paper, Mr. Haushalter said that true measurements of hardness are especially difficult because of the human element which still enters into such measurements, and predicted that as time goes on rubber men will undoubtedly standardize on basic recipes for springs, accurately determine their fundamental characteristics, and together publish them. He exhibited a number of graphic charts with curves indicating load-deflection, shear and torsion characteristics of various rubber specimens, including compression pads, rubber shear sandwiches and torsion springs.

FEDERAL GROUP HAS REGULAR MEETINGS

The existence of a "Federal Rubber Group" in Washington, D. C., which meets regularly although it has no offices, dues or general headquarters, has just come to light. A query to Mr. Everett G. Holt, Chief of the Leather and Rubber Division, resulted in the following information:

About four years ago the idea occurred to Mr. Holt that there might be benefit from bringing together at regular intervals the men in Federal offices in Washington who have work in connection with the rubber industry. Many of these individuals had contacted the Leather and Rubber Division from time to time. Mr. Holt proposed the idea of regular monthly meetings to Mr. Frank H. Whitehouse, of the Sundries Division of the Tariff Commission, who agreed it was a good one.

Group "Officially" Launched

The following month the "Federal Rubber Group" was launched by Mr. Holt and Mr. Whitehouse, who were joined by Dr. A. T. McPherson, Chief of the Rubber Section, National Bureau of Standards. At the next meeting the trio was joined by Loren G. Polhamus of the Division of Plant Exploration and Introduction of the Bureau of Plant Industry. These four have attended practically all meetings since.

Subsequently, the following men joined the Group: P. W. Barker (Leather and Rubber Division); Frederick Marchionna (Patent Office); Messrs. Leck, Gilchrist and Burroughs (Bureau of the Census); Roy Veatch (Office of the Economic Adviser, State Department); Messrs. W. L. Holt, Wood, Bekkedahl, Smith, Saylor Saeger and Emley (National Bureau of Standards); Mr. McMullen (Bureau of Plant Industry); Messrs. Whitley and Ungerer (Procurement Division, Treasury); Mr. Ballif (Tariff Commission); Lieut. Col. Rogers and Major Sadler (War Department); and Lieut. Commander King (Navy Department). During N.R.A. days, several members of that organization also joined the Group at lunch.

For convenience, the "Federal Rubber Group" meets at the Commerce Department Cafeteria. Meetings are held on the third Thursday of each month. At various times business visitors, in Washington by coincidence on a meeting date, have lunched with the "regulars."

On one occasion George Lamson (Firestone), C. C. Kiddey (Goodrich), W. F. Bloor (Goodyear), Leonard Smith (U. S. Rubber), and W. L. Finger (R. M. A.) joined the Group. On another, William Welch (Midwest Rubber Reclaiming). L. J. Plumb (U. S. Rubber Reclaiming), and J. F. McLean (Pequanoc) attended and gave the Group a picture of the economic importance of their industry. At a later meeting, Mr. Welch brought the motion picture "Rubber Reborn" for a local showing under the auspices of the Group. On still another, W. E. Klippert, manager of Goodyear's Central American plantation, explained developments in that country.

The existence of the "Federal Rubber Group" makes it possible for a business man to reach a representative cross-section of men in Federal offices who have work in connection with the rubber industry at one sitting. It also enables the government employees to keep in touch with the progress of work under way in other offices, and to pool information picked up from trade visitors to the various departments.

The Group has also had one social function to date, *i.e.*, an enjoyable "Ladies Night" at the Chevy Chase home of Mr. Polhamus, attended by about a dozen "members." Mr. C. Reed Hill, a former assistant chief of the old Rubber Division, before its merger with the Leather Division, was also present at this function.

Coming Events

Oct. 21. Rhode Island Rubber Club, Pawtucket Golf Club, Pawtucket, R. I.

Nov. 1. Los Angeles Group, Rubber Division, A.C.S., Mayfair Hotel, Los Angeles, California.

Nov. 4. Boston Group, Rubber Division, A.C.S., Boston.

Nov. 11. Akron Group, Rubber Division, A.C.S., City Club, Akron, Ohio.

Nov. 11-18. National Automobile Show, Grand Central Palace, New York City.

Dec. 26-28. American Physical Society, Annual Meeting, Washington, D. C.

Jan. 9-13. Annual Meeting, Society of Automotive Engineers, Detroit, Mich.

Jan. 20. Akron Group, Rubber Division, A.C.S., City Club, Akron, Ohio.

June 26-30. Annual Meeting, A.S.T.M., Chalfonte-Haddon Hall, Atlantic City.

Automobile Show Set

The annual National Automobile Show, sponsored by the Automobile Manufacturers Association, will be held this year from November 11 to 18 in the Grand Central Palace, New York City. Opening on Armistice Day, it will continue for eight days, including Sunday. The slogan for the show this year is "Turning Man Power Into Horsepower."

An index to Volume 43 of THE RUBBER AGE will be found facing page 60 of this issue.

RUBBER TRADE FACES GOVERNMENT PROBE

The rubber industry will come under severe scrutiny in the far-flung investigation soon to be launched by the United States Government through the Temporary National Economic Committee, sometimes called the "Monopoly Inquiry." First phases of the investigation, for which $500,000 has been appropriated, are expected to get under way about November first, and field representatives have already been sent into Ohio.

Although no actual mention of the rubber industry has been made by the Committee to date, Washington observers point out that the industry is bound to be covered by the investigators in view of the numerous past studies which have been made by both the Department of Justice (which recently charged tire manufacturers with collusive bidding for government contracts) and the Federal Trade Commission (which is still carrying its allegations on Goodyear's previous contract with Sears-Roebuck in the courts).

Six Federal agencies are cooperating with members of Congress in the investigation. The Department of Justice stresses the point that there is no intent to seek evidence for prosecution, but that the studies are being made to serve as guide posts to new legislation. The study of patents in relation to monopolies will be a broad part of the investigation.

TIRE COMPANY HEAD LAUDS COTTON CORDS

It is fortunate for the Southern cotton farmer and the textile plant that methods of producing heat resistant cotton cord have been developed with only a very nominal increase in cost so that the consumption of cotton in automobile tires will not only continue but will increase, according to a statement made by A. L. Freedlander, president and general manager of the Dayton Rubber Manufacturing Company, Dayton, Ohio, while visiting the general offices of the Bibb Manufacturing Company at Macon, Georgia, last month.

"Over the last twenty-five years," said Mr. Freedlander, "we have experimented with every known material and our tests on the road and in the laboratory prove that Heat Resistant Cotton Cord (made by Bibb) produces most satisfactory results, not only for extremely long life in tires, but, what is of more importance, a very high degree of safety."

The Dayton Rubber executive also expressed the opinion that no material known today can substitute for the new processed cotton in tires or belts, and that a higher price of a substitute material is not in itself an indication of superiority. Referring to the durability of the new cotton cord, he revealed that "we are directing all our energies to finding rubber compounds that will match the durability of the Heat Resistant Cord now developed."

ADVERTISING PAGES REMOVED

RUBBER UNION HOLDS ANNUAL CONVENTION

Approximately 130 delegates, representing 126 locals, attended the Third Annual International Convention of the United Rubber Workers of America, affiliated with the Committee for Industrial Organization, held the week of September 19th in the Hotel Hildebrecht, Trenton, N. J. Highlights of the convention follow:

The three executive officers were re-elected without opposition, *i.e.*, S. H. Dalrymple, president; Thomas F. Burns, vice-president; and Frank Grillo, general secretary-treasurer. Three organizers who were members of the General Executive Board were defeated for re-election and three others took their places. Attempts to secure a constitutional prohibition of organizers serving on the Board were defeated. A compromise preventing a majority of Board members from being organizers was carried. The re-joining fee of dropped members was reduced from $13.00 to $6.00.

Resolutions passed by the convention included endorsement of President Roosevelt for a third term; support to the railroad workers in their fight against a proposed wage cut; opposition to wage reductions under the Fair Labor Standards Act; and a pledge of allegiance to John L. Lewis.

The convention also went on record as being opposed to any tampering with the Wagner Act; reaffirmed its confidence in the personnel of the National Labor Relations Board; declined endorsement to the Townsend Plan; approved Federal chain store taxes; and recommended government ownership of munitions plants instead of a legislative draft of wealth in time of war.

NEW TEST STANDARD APPROVED BY A.S.T.M.

In the intervals between annual meetings of the American Society for Testing Materials, many of its standing committees complete work on new standards and also revisions of existing specifications and test methods, and a procedure has been established by which Committee E-10 on Standards acts for the Society in reviewing recommendations and determining whether there is a substantial consensus in the respective standing committee making the proposals.

At its meeting late in August, Committee E-10 approved a number of actions involving several new standards issued for the first time. Among these was a tentative standard covering proposed methods of tests for determining the resistance of rubber compounds to light checking and cracking, submitted by Committee D-11 on Rubber Products. Although tests for determining such resistance are widely used, no standardized procedure has been developed in the past. The new tentative standard has been identified as D 518-38 T.

The methods proposed in the new standard are for use in estimating the comparative ability of soft rubber compounds to withstand the effect of sunlight and weathering. They do not apply to the testing of material ordinarily classed as hard rubber. It is indicated that they are not suited for use in purchase specifications requirements both because correlation with service life is uncertain and because the results from duplicate specimens tested in different locations do not check.

No relation between the results of the tests and actual service performance is given or implied in the new standard. The tests are principally of value when used for comparisons between two or more rubber compounds. They consist of continuously exposing rubber specimens held under strain in direct natural sunlight and weather for definite periods and observing their deterioration as evidenced by the appearance and growth of minute cracks or crazing on the surfaces. The progressive deterioration may ultimately result in rupture of the specimens.

Acquires Composite Materials

The Brown Rubber Company, Lafayette, Indiana, has acquired a controlling interest in the Composite Materials Corporation of Detroit, Michigan. The Detroit firm makes a rubber-based, sound-deadening material used in the manufacture of automobiles. It is sprayed on interior metal panels and other parts.

Compares Safety Precautions

Returning from a two months' study of British highway safety measures, John M. Lessells, professor of mechanical engineering at the Massachusetts Institute of Technology, declared that American traffic safety precautions give domestic motorists a 300% "life expectancy edge" over British motorists, despite the fact that the United States has 25,342,000 automobiles to Britain's 1,839,000. The British approach to the problem of accidents is best seen, he said, in the campaign now being waged by English traffic officials in conjunction with the Tyre Manufacturers Association. This campaign is bolstered by the threat of fines for motorists who persist in riding on worn and threadbare tires. In marked contrast, the incentive for American motorists to ride on safe tires is provided by the constant progress being made in the development of low-cost safety tires.

Moore Joins Armstrong

W. A. Moore, formerly associated with the Rubber Service Laboratories Division of the Monsanto Chemical Company, has been named factory manager of the Natchez, Mississippi, plant of the Armstrong Rubber Company. The Natchez plant is rapidly nearing completion. It will be 190,000 square feet in size, and will employ approximately 400 for an initial production of 2,500 tires and tubes a day. Provision is being made to increase this capacity in the future. The building is of monolithic concrete construction and utilizes the Z-D type of roof of patented European design.

TESTING AIRPLANE TUBES FOR LEAKS AT GOODYEAR

The above reproduction of a photograph taken in the Akron factory of the Goodyear Tire and Rubber Company shows a young lady about to subject airplane tubes of various sizes to an inflation test by submerging them in the water-filled tank. This test is a regular part of Goodyear's factory procedure. Any possible leaks in the tubes are bound to reveal themselves.

NEW ENGLAND NEWS

September's flood and hurricane caused damage to a number of rubber goods factories throughout New England. The boiler room of Fisk Rubber Corporation in Chicopee Falls, Mass., was flooded on September 21, forcing the plant to close down. Steam pipes, required in rubber curing processes, were under three feet of water, and some machinery was damaged.

Damage to the ground floor of A. G. Spalding & Bros. plant in Chicopee was so great that officials said the whole floor, with the exception of the drop forge shop, would probably have to be abandoned. Three or four feet of mud and sand covered the floor when the water subsided. The damage was much greater than in the 1936 flood, it was stated. Pending a complete survey, the actual amount of loss could not be determined.

Many departments of U. S. Rubber Products, Inc., and its Naugatuck Chemical division in Naugatuck, Conn., were shut down as a result of the Naugatuck river flood. Cellars were flooded in many buildings.

Answering protests by officers of the Spalding Federal Labor Union and the Chicopee Chamber of Commerce, A. G. Spalding & Bros. has announced that its original plan to establish a separate plant in Brattleboro, Vt., for the manufacture of a low-priced grade of tennis rackets will not be changed. The Spalding company is quoted as stating there is no intention of abandoning its present factories in Chicopee, and that establishment of the Brattleboro plant will eventually bring more business to Chicopee. Up to now, it is pointed out, the Spalding company has not made a cheap line of rackets. Large-scale buyers, such as chain stores, have ordered their cheap rackets elsewhere and have placed orders for all grades of rackets with the same manufacturer.

By entering the low-priced field, Spalding hopes to obtain new customers for its better rackets. Lower wage scales and manufacturing costs in Vermont will make it possible for the company to enter the competitive market on rackets, it is pointed out. Suggestions that the needed extra factory space be obtained in Chicopee have been disregarded on this account.

Stamford Rubber Supply Co., Stamford, Conn., has announced a reduction of issued capital stock from $82,000 to $62,000, consisting of 620 common shares of $100 par value.

H. E. Savaria, for the past eight years assistant manager in the rubber, baseball and golf ball divisions of A. G. Spalding & Bros., Chicopee, Mass., is now president and treasurer of Sporting Goods, Inc., which has started operations at 88 Birnie Avenue, Springfield, Mass. The concern is manufacturing softballs and baseballs, and covering baseballs.

Tyer Rubber Co., Andover, Mass., has announced that a sliding wage cut, effective since last May, has been eliminated, the original scale being restored to 700 employees.

United States Rubber Products, Inc., Naugatuck, Conn., completed 150 days of accident-free operation on September 14, eclipsing the previous company record of 134 days. Last year the company won an award among large rubber companies, operating 2,250,000 injury-free man hours. During the first eight months of 1938 only two lost time accidents were reported, as compared with eight in the same period of the previous year.

Fisk Rubber Corp., Chicopee Falls, Mass., returned to a 36-hour week on September 6. About 100 employees were recalled to work. The change affected the entire plant.

New Type of Neoprene

The Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware, has announced the availability of an odorless grade of neoprene—Type G.

REPORT INDICATES GAINS IN INDUSTRY

A considerable increase in production and a moderate increase in employment and wages in the manufacture of tires and tubes in 1937, as compared with 1935, are shown by preliminary figures compiled from returns of the recent biennial census of manufactures made by the Bureau of the Census of the Department of Commerce.

The total value of products made in the tire and tube industry in 1937 amounted to $575,860,262, which exceeded the 1935 figure of $446,091,602 by 29.1%. The number of wage earners employed in 1937 was 63,290, an increase of 10.8% over the 57,128 reported for 1935. Wages in 1937 reached a total of $96,374,966, an increase of 23.2% over those paid in the previous census year.

The industry, as classified for census purposes, embraces establishments engaged primarily in the manufacture of pneumatic, solid and cushion tires and tubes for all classes of vehicles. Plants with annual production valued at less than $5,000 have been excluded from the current report as they have from all reports since 1919 because they account for only a negligible portion of the national output.

The report also reveals that there were 46 manufacturers operating in 1937 as compared with 42 in 1935 and 44 in 1933. Cost of materials, supplies, fuel, and purchased electrical energy in 1937 amounted to $366,858,443, as compared with $265,515,401 in the previous census year, and $139,392,070 in 1933.

LOS ANGELES NEWS

The Commercial Rubber Company, 1601 East 24th Street, retreaders, have installed machinery for the manufacture of their own camelback. The company's building, covering 12,500 square feet, was large enough to accommodate the new department. Three mills and one tuber were included among the needed equipment. When actual production gets under way in the next few months the working force is expected to be doubled.

The Bronson Rubber Company, which is headed by Bert C. Bronson, has moved to new quarters at 5168 Huntington Drive South.

A growing demand for the so-called synthetic rubbers, principally neoprene and "Thiokol," is being experienced in the Los Angeles area, chiefly because of the extensive oil industry, according to Charles N. Merralls, president of the Rubbercraft Corporation of California, Ltd., which has had repeated calls for these materials this year. The aircraft industry, too, is specifying the use of these products on rubber parts and accessories, Mr. Merralls said.

W. C. Layman, purchasing agent for Firestone, returned to work early this month after having undergone an appendectomy.

H. H. Huntington, director of the Huntington Rubber Company, 871 North Spring Street, who first entered the rubber manufacturing industry twenty-five years ago, was recently tendered a dinner by H. R. Minkoff, present head of the Huntington Rubber Company. More than seventy-five of Mr. Huntington's friends, most of them members of the rubber industry, attended the dinner. A loving cup was given to the guest of honor. The dinner was held in the Paris Inn.

Rubbercraft Corporation of California, Ltd., is manufacturing a rubber riffle board for use in gold mining. Riffle boards are employed in the amalgam process of gold recovery. In the past these boards have been more or less makeshift in their construction, according to Charles N. Merralls, president of the company, and it is to be hoped that the introduction of the rubber type of board will bring about uniformity.

N. Y. RUBBER GROUP HOLDS FALL MEETING

An interesting paper on "The Effect of Temperature on the Mechanism of Oxidation of Rubber. II. Coefficient of Oxidation," prepared by A. R. Kemp and J. H. Ingmanson of the Bell Telephone Laboratories, originally scheduled for delivery at the cancelled meeting of the Rubber Division, A. C. S., at Milwaukee, and an absorbing talk on "Science in Crime," by Inspector E. P. Coffey, Director, Technical Division, Federal Bureau of Investigation, featured the Fall Meeting of the New York Group, Rubber Division, A. C. S., held on September 16 at the Building Trades Club in New York City. Approximately 225 members and guests attended.

Following the usual excellent dinner, the meeting was called to order by Chairman C. A. Bartle (DuPont) who introduced Jacobus F. Frank, a representative of the government plantation of the Netherlands East Indies in the Far East, who was present. Mr. Bartle then read a communication from A. H. Nellen (Lee Tire) suggesting that future meetings of the Group be held in the afternoon rather than evening. This was tabled for future consideration. He then introduced Mr. Ingmanson who delivered the paper prepared by Mr. Kemp and himself. An abstract of the paper follows:

Abstract of the Paper

"The rate of oxidation of a vulcanized rubber compound containing no added antioxidant has been determined at 60°, 70° and 80° C. The rate of oxidation of the same compound containing an antioxidant has been determined at 80° C. Studies were confined to the oxidation range which accounts for substantial deterioration of physical properties.

"The quantity of oxygen taken up was determined by weighing tensile specimens aged in oxygen at about 2 atmospheres absolute and by determining loss of oxygen pressure in the aging vessel. Physical deterioration was correlated with quantity of oxygen absorbed.

"It was found that the quantity of oxygen absorbed was a linear function of the time of aging at each of the three test temperatures. It was also found that tensile strength and elongation at break decreased as linear functions of the quantity of oxygen absorbed following an initial induction period.

"The temperature coefficient of oxidation or physical deterioration was calculated to be 2.38 for each 10° C. increase in temperature over the range investigated. This is equivalent to an 8° C. rise in temperature to double the rate of oxidation which is in good agreement with the results of other investigators. Additions of antioxidant to the compound reduce the rate of oxidation which remains a linear function of time."

In discussing "Science in Crime," Inspector Coffey, who recently returned from an extensive investigation of European crime laboratories, cited a few cases in which scientific means were employed to track down criminals. He explained how the use of secret or invisible ink was detected, how the Bureau of Investigation determines whether different bullets came from the same gun, and how swindlers work the bond racket.

Revealing that the Bureau at Washington has a limited number of technicians on its staff, Inspector Coffey told of the outside help received from commercial laboratories in employing science to detect criminals. In concluding his address, he appealed to the rubber industry at large for assistance in the solution of problems the answers to which might be secured from the special facilities of rubber laboratories. An interesting speaker, the Inspector's talk was well received.

U. S. RUBBER SPONSORS LOS ANGELES MEETING

The first monthly supper meeting of the new season of the Los Angeles Group, Rubber Division, A. C. S., which drew an all-time record attendance of 129 members and guests, was held on October 4 in the Rainbow Room of the Mayfair Hotel in Los Angeles. The program was sponsored by U. S. Rubber Products, Inc., through the cooperation of F. S. Carpenter, factory manager of the Samson plant. This sponsorship was in keeping with the plans of the Group which call for programs arranged and presented at each meeting by one of the leading rubber manufacturing companies on the Pacific Coast.

A sound film on "The Adhesion of Rubber to Metal," prepared by J. D. Morron of U. S. Rubber's Detroit plant, was shown, explanatory remarks being made by A. F. Pond. "Tire Noises," a paper by Dr. Arthur Bull of U. S. Rubber, was presented with sound reproductions given to indicate the variety of vibration and sound produced by different tires in action.

A humorous feature of the evening was the presentation of an enormous balsa wood gavel to F. S. Carpenter, who acted as program chairman. It was presented through the courtesy of Ed Royal, Chairman of the Group, and several others. After its presentation it was passed around and each man present autographed it.

The door prize for the evening, 50 feet of garden hose, was won by L. C. Weimer (Voit Rubber), and the special prize, a rubber raincoat, went to Art Wolff (N. J. Zinc Sales). Rubber aprons were distributed as table favors. All prizes and table favors were donated by U. S. Rubber. Dinner music was furnished by the American Hawaiian Orchestra. Moving pictures taken of the summer fishing trip were shown. The next supper meeting is scheduled for November 1st at the Mayfair Hotel.

An index to Volume 43 of THE RUBBER AGE will be found facing page 60 of this issue.

R. I. RUBBER CLUB POSTPONES MEETING

The first meeting of the 1938-39 season of the Rhode Island Rubber Club, originally scheduled for September 30 at the Metacomet Golf Club, has been postponed until October 21st. It will be held at the Pawtucket Golf Club, because the Metacomet building and course was damaged by the hurricane which hit New England last month.

Both of the speakers scheduled for the September 30th meeting will present their papers at the meeting on October 21st. These speakers are Alan L. Grant of the Charles T. Wilson Company, New York City, whose subject will be "Trading in Rubber," and Robert A. Engel, Manager, Industrial Aromatics Division, Givaudan-Delawanna, Inc., New York City, who will speak on "Unusual Properties and Uses of Aromatic Chemicals."

As usual, a golf tournament will precede the dinner and meeting. Tickets are $1.50 for members and $1.75 for non-members. Greens fees are $1.00 and prizes will be distributed to winners in various events. Tickets may be secured in advance from David C. Scott, Jr., c/o Henry L. Scott Co., Blackstone Street, Providence, R. I.

Program for Future Meetings

According to Charles Berlow, of the American Wringer Company, Chairman of the Rhode Island Rubber Club, four meetings are planned for the coming season, the first on October 21st, and others in December, April and June. Definite angles will feature each meeting, such as: (a) Rubber Industry as the Business Man Sees It; (b) Rubber Industry from the Chemist's Viewpoint; (c) Rubber Industry as Seen by the Mechanical Engineer; and (d) Rubber Industry on a Holiday. This latter meeting would actually be an outing in June.

Mr. Berlow also revealed that David Scott, Jr., secretary-treasurer of the Club, has been asked to act as a clearing house for the purpose of helping members, especially the younger ones, to get jobs. Any one knowing of openings in the New England territory is urged to communicate such information direct to Mr. Scott.

Akron Group Sets Meetings

The Fall and Winter meetings of the Akron Group, Rubber Division, A.C.S., have been scheduled for November 11 and January 20, respectively, at the Akron City Club. Dr. William C. Geer will be the chief speaker at the November 11 meeting, although his subject has not yet been announced. Mr. William Welch, president, Midwest Rubber Reclaiming Company, will show the moving picture "Rubber Reborn" at the January 20 meeting. Plans are under way to complete the season's program with a Spring meeting and a Summer outing. Details as to dates and speakers will be announced shortly.

Obituaries

Harry M. Dannenbaum, Sr.

Harry M. Dannenbaum, Sr., president of the Aldan Rubber Company, manufacturers of rubberized fabrics, and of the Schwarzwaelder Company, shrinkers and finishers, both of Philadelphia, died on September 15 in the Jewish Hospital in Philadelphia after an operation for appendicitis. He was 66 years of age. Born in Philadelphia, Mr. Dannenbaum attended Central High School in that city and shortly after being graduated became associated with Louis Schwarzwaelder in the waterproofing business. Upon Mr. Schwarzwaelder's death in 1892, Mr. Dannenbaum took over the business, which rapidly expanded under his management.

Approximately thirty years ago, Mr. Dannenbaum recognized the fact that rubberized fabrics were affecting the sales of waterproof fabrics in the clothing industry, and therefore he established a rubberizing division of the Schwarzwaelder Company. Ten years ago the steady growth of this division resulted in the formation of a separate company, called the Aldan Rubber Company, and the activities of the new company were removed to a new and more spacious plant. Mr. Dannenbaum is credited with introducing the English rubber spreading method into the United States. He was vice-president of the Skin and Cancer Hospital, and also took an active interest in other philanthropies.

Funeral services were held on September 18, with interment in Mt. Sinai Cemetery in Philadelphia. He leaves a widow and two sons, Albert K. and Harry, Jr., both of whom are active in the management of the Aldan Rubber Company.

Charles E. Duryea

Charles Edgar Duryea, often termed the "Father of the Automobile Industry," died in his seventy-fifth year at his home in Philadelphia on September 28 after an illness of about 18 months. Born in 1861 near Canton, Illinois, he helped with farm labor while attending school and at the age of 17 built his own bicycle. He took two three-year courses at Gitting's Seminary at La Harpe, Ill., and in 1882 wrote on "Rapid Transit Other Than on Rails" in his graduating thesis, in which he predicted flying machines and half-day flights to Europe. He invented various bicycle improvements and in 1884 began to take an interest in "horseless carriages."

In 1891 Mr. Duryea started the construction of an automobile and in 1895 began to manufacture cars under the name of the Duryea Motor Wagon Company. Although controversy still exists as to whether Duryea or Elwood Haynes actually built the first automobile, the inventor's first car is on exhibit at the Smithsonian Institution, as is that of Haynes.

Mr. Duryea is also credited in large measure with the growth and development of the pneumatic tire industry. In 1894, when he was building his third car, he envisioned the need for pneumatic tires. He placed an order for such tires with the Hartford Rubber Works, which more than thirty years ago became part of the U. S. Rubber Co. The tires were single tubes with a two-inch cross diameter. Two were for the 44-inch diameter front wheels and two for the 48-inch rear wheels. With this first set of pneumatic tires, Mr. Duryea won America's first automobile race on Thanksgiving Day in 1895, over the roads from Chicago to Evanston and back, a distance of approximately 50 miles.

In commenting on Mr. Duryea's death, Mr. F. B. Davis, Jr., president of U. S. Rubber Co., stated: "It is only fair to state that the tire industry acknowledges its debt to Charles Edgar Duryea for his foresight in envisioning the possibilities of the pneumatic tire on automobiles. From the manufacture of his historic set of crude tires a great industry has grown. Today it employs close to a quarter of a million men and women, and in 1937 sold tires and tubes to the values of $492,770,000." Mr. Duryea leaves a widow, two daughters and a son.

Israel Laurie

Israel Laurie, founder and president of the Somerset Rubber Reclaiming Works, East Millstone, N. J., died at his home in New Brunswick, N. J., on October 2, in his sixty-ninth year, after an illness of two years. He was forced into retirement in 1936 after suffering a stroke. Mr. Laurie was born in Valkimir, Russia, in 1869 and came to the United States when a young man in 1893, settling in Somerville, N. J. Thirteen years ago he moved with his family to New Brunswick. Approximately 30 years ago he founded the New Brunswick Iron and Metal Company, and later the Somerset Rubber Reclaiming Works. Mr. Laurie was widely known for his philanthropies, both to Jewish and nonsectarian organizations. He took an active part in the plan to unite all local Hebrew schools into a single institution, the plan being completed successfully in 1924 with the founding of the United Hebrew School. Interment was in the Van Liew Cemetery in New Brunswick. He leaves a widow, five daughters and one son, Irving, who is secretary-treasurer and sales manager of the Somerset company.

An index to Volume 43 of THE RUBBER AGE will be found facing page 60 of this issue.

Frank Berenstein

Frank Berenstein, president of the Panther-Panco Rubber Co., the Panther Rubber Co., Ltd., the American Tile and Rubber Co., and the Puritan Rubber Manufacturing Co., died in his sixty-fifth year at Bethlehem, New Hampshire, on Saturday, September 10, from a heart ailment.

Mr. Berenstein first entered the rubber industry in 1903 when he joined the old Walpole Rubber Company. He resigned five years later to become one of the founders of the companies he later headed as president. Plants of these companies are now located in Stoughton and Chelsea, Mass., Trenton, N. J., and Sherbrooke, Quebec, Canada. Mr. Berenstein was deeply interested in philanthropy and distributed largesse to a number of charitable institutions.

Funeral services were held in Chelsea with interment in Woburn, Mass., on September 11. He leaves a widow, three sons and three daughters. Two of his sons, Maurice and David, are sales manager and factory superintendent, respectively, of the Panther-Panco Rubber Co.

Carmon A. Myers

Carmon A. Myers, founder of the East Akron Supply Company, and one-time director of engineering for the Firestone Tire and Rubber Company, died recently at the age of 60 at his home in Akron, Ohio. Mr. Myers is credited with having laid out the Firestone rubber plants in Akron and was also in charge of building the company's factories in California and in Canada. He was devoted to civic interests and helped promote many of Akron's cultural and benevolent affairs.

Alfred P. Lohmann

Alfred P. Lohmann, formerly associated with the B. F. Goodrich Company, died suddenly at his home in Devon, Penna., on September 5, at the age of sixty-three. He joined Goodrich in July, 1896, and was director of engineering at the time of his resignation in 1918. Since his resignation he had acted as a consulting engineer for industry. He leaves a widow, two sons and a daughter.

Joseph A. Roberts

Joseph A. Roberts, formerly well known Akronite and associated with his brother H. W. Roberts in the operation of the Pierce-Roberts Rubber Company, died at his home in Trenton, N. J., on October 3, following a long illness. He was 50 years of age. Funeral services were held on October 6. Besides his brother, he leaves his mother.

Commodity Firms Merge

The firm of Munds, Winslow & Potter and that of Laird, Bissell & Meeds, both of which have been active in the security and commodity markets, will be merged on November 1. The new firm will be known as Laird, Bissell & Meeds.

FINANCIAL NEWS

FIRESTONE LAUNCHES LOAN OF $50,000,000

The Firestone Tire and Rubber Company, Akron, filed a registration statement on October 5 with the Securities and Exchange Commission for an issue of $50,000,000 ten-year 3½% debentures due October 1, 1948. Brown Harriman & Co., Inc., and Otis & Co., were named as the principal underwriters. These debentures will represent the sole funded debt of the company and of its subsidiaries.

The proceeds to be received by Firestone from the sale of these debentures will be used to retire $5,555,000 of the Firestone Tire & Rubber Company of California fifteen-year 5% bonds which were called for redemption on September 1, 1938, and to retire $7,272,000 of the twenty-year 5% S. F. Bonds of Firestone Cotton Mills due March 1, 1948 and the remainder of the proceeds will be used to retire all bank loans and to provide added working capital.

Total Assets Listed

At July 31, 1938, total assets of the company amounted to $174,161,000, of which $89,733,000 were current assets and $82,062,000 (net) represented plant and property and other assets. Current liabilities, excluding the bank loans all of which are to be retired, totalled only $8,168,000, and bonds of subsidiaries, all of which are likewise to be retired, $13,300,000. The total equity represented by preferred and common stock, reserves and surplus amounted to $110,569,000.

Consolidated income statements show that income available for interest and federal taxes over the past ten fiscal years, after depreciation averaging $5,422,000, has averaged $7,980,000; for the past five fiscal years such income, after depreciation averaging $6,038,000, has averaged $8,427,000; and for the fiscal year ended October 31, 1937, after charges for depreciation amounting to $5,947,000, income available for interest and federal taxes totalled $12,434,000. Maximum annual interest requirements on the new issue of debentures will amount to $1,750,000.

A fixed sinking fund is to be established commencing August 25, 1939, to retire $1,500,000 of debentures annually. In addition, an earnings sinking fund will be established, into which Firestone agrees to pay the trustee on February 23, 1940, and on February 23 each year thereafter, an amount equal to 20% of the consolidated net income of the company for the fiscal year next preceding the date of such payment, or sufficient to retire $1,200,000 of debentures annually, whichever is the lesser amount

Sanction Seiberling Plan

Stockholders of the Seiberling Rubber Company of Canada have been notified that the courts have sanctioned arrangements approved by preferred and common stockholders under which all preferred shares and accumulated dividens are cancelled, and in exchange preferred stockholders will receive three shares of common stock for each share of the senior issue. Seiberling Rubber Company (of Akron) owns all of the common stock of the Canadian company and 1,481 shares of the preferred stock. It is also understood that the American company has arranged for extension of its 6% debentures for one year from November 15. Outstanding debentures, as of December 31, 1937, totalled $2,350,000.

Dividend by Dayton Rubber

The Dayton Rubber Manufacturing Co., Dayton, Ohio, has declared a dividend of 50 cents on its common stock and a semi-annual dividend of $1.00 on the Class A stock, both payable on October 27 to stock of record on October 17. This marks the first dividend paid by the company on its common stock since 1929. A distribution of $1.00 on the Class A stock was made last July.

Pharis Tire & Rubber Co.

Eight Months to August 31: Net profit of $329,339, equal to $1.50 each on 220,000 common shares, after all charges. Gross sales for the first eight months of 1938 amounted to $5,220,122, as compared with $4,751,096 in the corresponding period of the previous year.

Faultless Rubber Co.

Year Ended June 30: Net profit of $15,329, after all charges, which is equal to 23 cents each on 65,450 no-par capital shares, as compared with profit of $187,426, or $2.86 a share, in the previous year.

Consider Mexican Factory

The Mexican Ministry of National Economy, Mexico City, reports that a study of the country's rubber plantations and factories is being made by William H. Manning and Otto V. Kleiner, executives of a rubber manufacturing enterprise at Montreal, Canada, with a view to the establishment of a new rubber factory. The Canadian firm is expected to establish a branch factory in Mexico, according to the Ministry. Rubber growers in Chiapas, Guerrero and Tabasco are said to have offered the Canadian company facilities for founding the factory in their respective regions.

TRADE REPRESENTED IN TIME CAPSULE

Several objects used and manufactured by the rubber industry were included in the more than one hundred solid objects representative of the present day inserted in the 800-pound copper alloy "Time Capsule" which the Westinghouse Electric & Manufacturing Company has consigned to the people of 6939 A.D.

The capsule, made of burnished Cupaloy, was lowered fifty feet into the ground at the site of the Westinghouse Building on the grounds of the New York World's Fair on September 23. It contains a resume of modern civilization and is not to be opened for 5,000 years. Clues to its whereabouts will be mentioned in books placed in libraries throughout the world.

The following rubber objects were inserted in the capsule: a "Kro-flite" golf ball, furnished by A. G. Spalding & Bros.; a specimen of raw rubber and a piece of "Lastex" cloth, by U. S. Rubber Products, Inc.; a section of a modern tire, by Fisk Rubber Corp.; a specimen of neoprene, by DuPont; and a rubber cord for electric razors, by Remington Rand. The inscription on back of the section of a modern tire states that "the tire served as a protector for a thin rubber air container."

Trade Commission Citations

The Federal Trade Commission announces that two tire distributors have entered into stipulations to discontinue certain misleading representations in connection with the sale of their products. The Westminster Tire Corporation, New York City, has agreed to cease asserting that Kenyon Black Truck Tubes will not "grow" on heat jobs, and also to discontinue pictorial representations indicating that it owns and uses all of certain buildings in making its products when such is not the case. Ajax Tire & Rubber Corporation, New York City, has agreed to stop labelling its tires with phrases implying that the tires have either 6 or 8 bead-to-bead plies when such is not a fact. The Perfect Mfg. Co., Cincinnati, has been ordered to stop claiming that its "No-Flatz" makes tires absolutely puncture-proof.

New Synthetic Rubber Plant

A large factory has been constructed in Debica, located in the newly-designated Central Industrial District of Poland, for the manufacture of "Ker"—the name given by the Polish Chemical Association to a new synthetic rubber. Two firms are interested in the new factory, one being that of "Stomil", the largest manufacturer of tires in the country, and the other being the Zrzeszenie Producentow Spirytusu (Association of Spirit Producers), with the latter having the larger financial interest. The capital of the organization which will produce "Ker" is said to be 1,100,000 zlotys (approximately $210,000 at the current rate of exchange).

Names in the News

ALFRED A. CURTIS, vice-president and general manager of the Lima Cord Sole and Heel Co., Lima, Ohio, since August 1, has been elected president of the company to succeed the late F. L. MAIRE.

WILLIAM D. ANDERSON, president, Bibb Manufacturing Co., Macon, Georgia, was scheduled to address the annual meeting of the National Association of Independent Tire Dealers, Inc., at New Orleans, La., on October 12, on the subject of "Recent Developments in Tire Cord Fabrics and Heat Resistant Cotton Versus Rayon."

PAUL ELBOGEN, president of the crude rubber brokerage house bearing his name, with headquarters in New York City, has returned from an extended trip to the Far East where he visited the principal rubber exporting centers and contacted his company's various suppliers.

MICHAEL F. O'NEIL, in charge of dealer relations for the Firestone Tire and Rubber Co., Akron, addressed a meeting of the Akron Real Estate Board on September 12. He advised more "personalizing" in sales talks.

HARVEY FIRESTONE, JR., vice-president, Firestone Tire and Rubber Co., Akron, was the chief speaker at the annual field day of the Princeton Alumni Association of Northern Ohio, held on October 1 at the Kirtland Country Club, near Cleveland.

U. L. HARMON, vice-president, Dryden Rubber Co., Chicago, has been named chairman of the Rubber Group for the 1938 campaign of the Community Fund of Chicago. He was chairman of the same group last year.

A. F. LANDEFELD, associated with the Goodyear Tire and Rubber Co., Akron, for a number of years, has been named manager of the company's Pliofilm Sales Division in charge of all Pliofilm sales. The Division's activities will be widened in scope.

WILLIAM M. BECHLER, assistant controller, B. F. Goodrich Co., Akron, completed 30 years of service with the company last month. He joined Goodrich as a clerk in the billing department in 1908 and was made manager of the mechanical cost department in 1917.

STANLEY G. DUNNING, formerly general sales manager for the Muralo Co., paint manufacturers of Long Island City, N. Y., has been named sales manager for the New England Whiting Co., East Boston, Mass., and vice-president in charge of sales for the West Coast Kalsomine Company of Louisiana.

J. C. CLINEFELTER, of Akron, Ohio, has resigned as the representative of the Black Rock Manufacturing Co., Bridgeport, Conn., in the mid-West area, to devote all of his time to the representation of John Royle & Sons, Paterson, N. J.

N. E. MCLAUGHLIN, at one time in charge of dealer advertising for U. S. Rubber Products, Inc., has formed a point-of-sale advertising company under his own name at 7 East 42nd Street, New York City.

J. G. FOL, noted rubber technologist, has resigned as Director of the Technico-Commercial Department of the Rubber Foundation (in Holland). DR. A. J. ULTEE has been appointed acting director.

ARTHUR W. DURR, a development engineer in the Akron plant of the American Hard Rubber Company, received an honorable mention award for designing a machine for producing medical applicators for use in hospitals, in the $200,000 industrial award competition sponsored by the James F. Lincoln Arc Welding Foundation.

E. F. TOMLINSON, until recently in the Chicago office of the manufacturers' sales department of the B. F. Goodrich Co., Akron, has been transferred to Milwaukee in charge of manufacturers' sales. P. E. TOBIN, of the manufacturers' sales division in Akron, has been transferred to the Detroit office of the same division.

SIR GILBERT MORGAN, well known in the rubber industry for his investigations of plastic materials from rubber and tar products, will shortly retire from the directorship of the National Chemical Laboratory, Teddington, England. He will become chairman of the Research Fund Committee of the Institute of Brewing in London.

LURELLE GUILD, one of the country's outstanding industrial designers, has been retained by the Wooster Rubber Co., Wooster, Ohio, in an advisory capacity to aid in the designing of the company's "Rubbermaid" products.

GORDON STANLEY (MICKEY) COCHRANE, formerly manager of the Detroit baseball team in the American League, has joined the Dryden Rubber Company of Chicago. He will act as the company's special representative in the Detroit area.

EVERETT G. HOLT, chief of the Leather and Rubber Division of the Bureau of Foreign and Domestic Commerce, Washington, D. C., addressed the Akron Export Club at the Akron City Club on October 6.

RETREADING GAINS TOLD IN ARTICLE

The progress of the tire retreading industry, and its effect on the rubber industry in general, was given in an article in a recent issue of *Business Week*. According to the article, retreads are absorbing approximately 5% of the replacement tire trade for passenger cars and up to 20% of the truck tire business. Estimates from retreaders and producers of camelback indicate that some 4,500,000 tires will be renovated this year. This would represent a million-unit gain over 1937.

Realizing the inroads of retreads into their profitable replacement market most of the tire companies are now producing camelback, according to the article. This year about 30 tire manufacturers and 16 non-tire companies will turn out over 33,000,000 pounds of camelback, it is estimated. Three-fourths of this amount is expected to be manufactured by 14 companies, including U. S. Rubber, Firestone, Goodrich, General Tire, Mohawk and Fisk. Among non-tire companies now producing large volumes of camelback are Imperial Manufacturing Co., Quaker City Rubber Co., Oliver Rubber Co., and Texas Tire & Rubber Co.

The article also makes the following statements: For passenger car tires the saving is 50% as compared with the cost of new tires; for truck tires the savings range from 15 to 40%; retreading chains are imminent in the near future; tire manufacturers account for over 100 retread plants in their company stores; there is some feeling that the field is over-expanded with too many molds for potential business; some retreaders are importing worn carcasses from England for renewing and sale in this country; recapping is replacing the older retreading method.

Carter Bell Moves

The Carter Bell Manufacturing Company, producers of rubber substitutes and other products, has removed its general offices from New York City to its factory in Springfield, New Jersey. Better facilities are provided at the plant to render more prompt service to the trade, according to Lawrence Chidester, general manager. Mr. Chidester is the son of the late W. H. Chidester, one of the founders of the company, who was president and treasurer at the time of his passing last April.

Purchases Waldo Properties

The real and personal property and effects of E. M. & F. Waldo, Inc., chemical manufacturers, were purchased on September 15 by the Mineral Pigments Corporation, Muirkirk, Maryland, according to Mr. N. D. Scowe, president of that company. The actual purchase, exclusive of accounts and notes receivable, was made by a James Pearson Hill for $7,510, after a show-cause order why the sale should not be made was issued by James P. Curley.

CROSS SECTIONAL PHOTOMICROGRAPH

It's the

'EGG-SHELL' SURFACE *and* POROUS INTERIOR

of Micronex Beads that Insure Complete Dispersion

MICRONEX

THE *Premier* CARBON BLACK FOR RUBBER USE

Beads or Compressed

Micronex Beads are built on the egg theory of an outer surface just strong enough to keep the contents in the best possible condition, and an inner mass which is porous by comparison with the shell. This unique and patented method of manufacture serves two purposes. The pellets remain intact in transit and through conveyors. Even more importantly, the exterior breaks down easily in the rubber mass resulting in the complete release of each minute carbon particle. In this respect Micronex Beads have no rival.

BINNEY & SMITH CO.

DISTRIBUTORS

41 East 42nd Street, New York

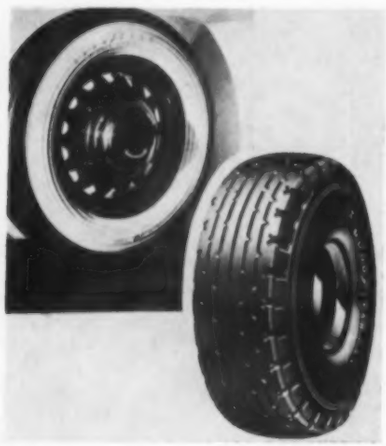
COLUMBIAN CARBON CO.

MANUFACTURERS

New Rubber Goods

Two New Goodyear Tires

A new Double Eagle Airwheel passenger car tire and a new YKL truck tire have been introduced by the Goodyear Tire & Rubber Co., Akron, Ohio. Rayon



is used for carcass construction in the new passenger car tire which has only four plies and yet weighs 10% less than a six-ply tire built of conventional cord. Tests are said to have proved that this new tire rolls so smoothly that it actually cuts down gasoline consumption while multiplying tire mileage. The new truck tire, like its predecessors, is built of rayon fabric, but includes a special, new ribbed-tread design. The side walls have new ribs to further resist scuffing, while the tread itself is flatter, providing more rubber contact with the road. Notched, circumferential ribs in the tread center aid in slow, even wear and provide traction. The tread is designed for all wheel positions on tractor or trailer in general haulage service.

Rubber Bathing Jewelry

The newest novelty seen at beach resorts this past season was bathing jewelry made of rubber. Included was a hair ornament, a lei or necklace, and

a bracelet or anklet. These ornaments are made up of rubber flowers, the petals and centers being of contrasting shades to give an appearance of reality and beauty. The hair ornament, which can be worn on the hair or over a bathing cap, has a half-dozen of the rubber flowers fastened to an invisible coronet (see illustration) while the lei and bracelet are secured to thick, heavy rubber bands. W. T. Stopford, 347 Fifth Avenue, New York City, introduced the rubber bathing jewelry.

Rubber-Jacketed Condensers

Rubber-jacketed paper condensers are now being offered by the Aerovox Corporation, Brooklyn, N. Y., to meet superior electrical characteristics demanded for radio frequency functions. No moisture is released by the vulcanizing process in the manufacture of these units. Vulcanization is accomplished at a temperature below the vacuum-impregnation cycle of the section as contrasted with elevated temperatures of usual phenolic resin molding, according to Aerovox engineers. Hence there can be no absorption of moisture by the condenser section. The paper section too is fully safeguarded during vulcanization and does not alter its electrical characteristics. Tests indicate that the new rubber-jacketed units have a life several times greater than that heretofore associated with compact paper condensers.

Auburn Brick Blocks

Auburn Rubber Corporation, Auburn, Indiana, is featuring several rubber brick building block sets. The rubber bricks hold together by means of the "fit-tite" construction developed by the company. The bricks may be boiled and sterilized,

thus protecting the children using them. They are packed in a four-color box measuring 9 x 16 inches, and a complete architectural booklet, with 46 different designs, is included with each box. One set consists of 146 rubber pieces, two roofs, and a book of designs. Another has 292 rubber pieces, three roofs, and the design book. These sets are described as educational toys with year around sales appeal.

Spell-O-Tex Letters

Originally designed for use by owners of home movie equipment for preparing titles and captions, the Spell-O-Tex Letters manufactured by the Besbee

Products Corporation, Trenton, N. J., are finding extensive use in department and other retail stores for listing features and tagging specials. These letters are made of sponge rubber with a special suction pad laminated on back. They will stick to any surface, will not leave a trace after removal, are available in black, silver, red and blue, and range from ½ to 2 inches in size. The letters are sold in various sets, one set including 135 one-inch letters, with background panel and ruler for alignment. Besbee Products is also featuring an Animated Cartoon set, made up from a series of conventionalized forms, stamped from sponge rubber, and backed with the company's adhesive material.

Rubberized Cement Bag

A new means of batch hauling and dumping bulk cement for construction work is now provided in a new cement bag offered by the Blaw-Knox Company, Pittsburgh, Penna. The bulk cement container, which has a capacity of eight standard bags, is made of heavy canvas, rubberized on both sides to form a weatherproof material. It is reinforced as well as multiple-sewed at points of strain or wear. The reinforced hem at the closed end of the bag is constructed

for bolting to the partition board of the hauling truck while the other end is open and equipped with flap covers. After loading, the end flaps are folded and the weight of the cement pressing against the aggregates seals the bag.

Swaggerette Household Gloves

A new line of latex-coated fabric gloves, under the trade name of "Swaggerettes," has been introduced by the Edmont Manufacturing Co., Coshocton, Ohio. The gloves are smartly styled for feminine use, are easy to slip on or off, and are water-

proof, snag-proof and dirt-proof, according to the manufacturer. Especially designed for home use, they may also be utilized for working in and around the garden and other outdoor occupations. The gloves are individually wrapped in cellophane, twelve to the display container. They come in small, medium and large, and in green, salmon and black.

Victor Typewriter Keys

A line of Velvet Cushion Typewriter Keys, made of rubber especially treated to give the keys a "velvet" surface, has been introduced by the Victor Safe & Equipment Co., Inc.,

North Tonawanda, N. Y. The keys, attractively packaged, are available in a variety of colors and are made to fit all standard makes of typewriters, in either concave or convex styles. The company is also featuring a line of rubber twirler rings to fit all typewriters.

Mud-and-Snow Tire

Featuring a rugged lug type tread, a new mud-and-snow tire is being merchandised by the U. S. Tire Dealers Corporation, New York City. The tread design consists of a series of staggered lugs so arranged that the load is uniformly transferred from lug to lug as the tire turns. It is claimed that the design serves to put more rubber on the ground and provides the car or truck with greater pulling power. In addition, the new tire has a wide center rib which serves to buttress the lugs for extremely hard pulls and assures uniform wear and smoother riding. Non-skid designed sidewalls and extra-heavy reinforced body construction are said to offer users protection against rut wear as well as extra resistance to the severe conditions found in rough, muddy and rutted roads.

Klein-Kord Safety Strap

A new type of safety strap for linemen and other outdoor workers—one which gives a definite warning when to discard it—has been developed by M. Klein & Sons, 3200 Belmont Ave., Chicago, Ill. Known as the Klein-Kord Red Center Safety Strap, the new strap is made of six plies of long staple cotton, each ply laid in rubber and vulcanized. Red rubber is used on the two center plies. When, after a period of use, the red shows through the outer covering it is a signal that the belt should be discarded. Tensile strength of the new belt is 5,660 pounds per square inch.

Acqua-Rubberseal Paint

Acqua-Rubberseal is the trade name of a new rubber-base paint made by Acqua-Pruf, Inc., 786 Broad St., Newark, N. J. Said to be alkali, acid and corrosion proof, the new paint may be applied by brushing or spraying, one gallon covering up to 800 square feet. It is recommended for use on structural steel, oil, gas and water tanks, acid towers, agitators, tank cars, basement walls, and other surfaces where resistance to moisture, sunlight, wind, and other elements is desired. It is said to dry hard within an hour after application, and will not blister, chip, peel, or crack.

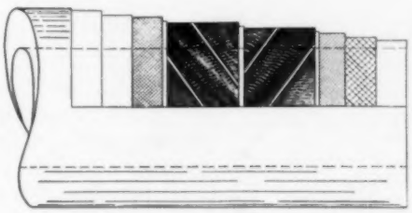
Clark Kickless Cable

A water-cooled kickless cable which serves as the electrical connection between the secondary taps of a welder transformer and a portable welder gun has been introduced under the trade-name of the Clark Kickless Cable by the Clark Controller Co., Cleveland, Ohio. It consists of a central rubber core around which are helically wound, flexible, tinned copper cables. For

alternate polarity these cables are separated by a corrugated rubber spacer, the whole being enclosed in a flexible, wire and woven fabric reinforced rubber tube. This construction permits circulation of cooling water in direct contact with the stranded copper cable and provides the necessary flexibility. It also permits the passage of approximately 50% more welding current than is now passed by separate welder cables of comparable size.

Goodyear Rotary Hose

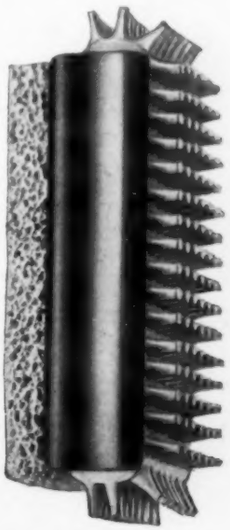
An improved rotary hose, identified as Style 3154, has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. The improvements include a third bead wire extending back from each end approximately five feet. The hose, designed for



service within the 1,500 pound working pressure range, is of 7,000 pound burst construction, will not readily crush or kink, and is of the super-flexible, high-pressure type. It has a tough compounded rubber tube, with the body construction consisting of multiple plies of extra heavy cotton duck and two distinct layers of bead wire spiralled in opposite directions, each layer being imbedded in rubber and insulated from each other by rubber and duck.

Du-Plex Rubber Suede Brush

There is a growing tendency to use only rubber brushes to clean suede shoes since brass wire brushes, used for many years, are believed to be injurious to the soft tannages used for present day shoes. One of the companies now selling these rubber brushes is the Everett & Barron Company, Providence, R. I. The Du-Plex Rubber Suede Brush featured by this company is constructed of rubber snags or teeth and sponge rubber on opposite sides of a lacquered brush



block made in various colors. The rubber teeth raise the nap without injuring the leather, while the sponge rubber removes the dirt and makes the leather smooth and velvety.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, OCTOBER 10, 1938

Crude Rubber

A HIGHLY nervous and erratic market, due largely to European war scares, has governed crude rubber prices since our last report. On September 13, one day after our last report, the price for spot on the Exchange dropped sharply from 16.55 to 16.05 due to news reports from Central Europe. Announcement by the International Rubber Regulation Committee that the new restriction agreement permits an increase of 5% in planted areas during the 1939-1940 period, made on the following day, brought the price up to 16.25. The price moved irregularly until September 27 when heavy commission house liquidation, brought on by further distressing news from Europe, served to break the price severely from 15.95 to 15.20. The prospects of peace in Europe and the actual settling of the German-Czechoslovakian dispute has sent prices upward in the past ten days, with only occasional temporary halts to the advance. Today's price for spot (October 10) was 17.25. Quotations in the outside market, Exchange, London, and Singapore, follow:

As of October 10

Plantations—

Ribbed Smoked Sheets—

No. 1 Spot	—	@	.17⅜
January-March	—	@	.17⅜
April-June	—	@	.17⅜
No. 2		@	.16⅞
No. 3		@	.16¼
No. 4		@	.16
Thin Latex Crepe		@	.18⅛
Thick Latex Crepe		@	.19
Brown Crepe, No. 1		@	.16⅞
Brown Crepe, No. 2		@	.16¼
Amber Crepe, No. 2		@	.16⅞
Amber Crepe, No. 3		@	.16¼
Amber Crepe, No. 4		@	.15⅝
Brown Crepe, Rolled		@	.14⅞

Latex—

Normal, per lb., carload lots	—	@	.20¼

Paras—

Up-River, fine		@	.15⅜
Acre Bolivian, fine		@	.15½

Balata—

Surinam sheet	—	@	.38

LONDON MARKET

Standard Smoked Sheets—Buyers—October 10

January-March	8⅝d	@	8¼d
April-June	8¼d	@	8⅜d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—October 10

October-December	—	@	8⅛d
April-June	—	@	8⅜d

Reclaimed Rubber

Reclaimers report a sharp resumption of activity, with special demand from insulated wire and sponge rubber manufacturers. The general improvement of conditions in the rubber industry is also responsible for the increased demand for reclaims. Consumption of reclaim in August showed a 30% gain over the previous month. There has been no change in the price structure since our last report. Current quotations follow:

Shoe

Unwashed	lb.	.06½	@	.06¾
Washed	lb.	.10	@	.10¼

Tube

No. 1 (Floating)	lb.	.12	@	.12¼
No. 2 (Compounded)	lb.	.08	@	.08¼
Red tube	lb.	.08	@	.08¼

Tires

Black (acid process)	lb.	.06¾	@	.07
Black, selected tires	lb.	.06	@	.06¼
Dark Gray	lb.	.09¼	@	.09¾
White	lb.	.11½	@	.12
Truck, Heavy Gravit	lb.	.05½	@	.06
Truck, Light Gravity	lb.	.07	@	.07½

Miscellaneous

Mechanical blends	lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

Although trading in scrap rubber has been light in the past few weeks, dealers are optimistic for the early future, especially with crude rubber holding up around a 17-cent figure. Prices have been increased slightly on some grades of scrap since our last report. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	17.50	@	17.75
Mixed auto	ton	10.50	@	12.00
Beadless tires	ton	14.50	@	16.00
Clean solid truck tires	ton	21.00	@	23.00
Boots and shoes	ton	18.00	@	20.00
Arctics, untrimmed	ton	13.00	@	15.00
Inner tubes, No. 1	lb.	.07	@	.08
Inner tubes, No. 2	lb.	.03¾	@	.03⅞
Inner tubes, Red	lb.	.03¾	@	.03⅞

Cotton

Due to the war scare in Europe, the price of middling uplands on the Cotton Exchange dropped below 8 cents a pound on September 13, low for the period, remained fairly steady for a few days, then jumped to 8.25 on September 17. This sharp revision in the price structure was due in large part to the fact that although the Government offered to lend growers 8.30 cents a pound, middling was being quoted in leading markets in the South under 8 cents a pound, and in Texas as low as 7.52 cents. Confronted with this situation, the New York Cotton Exchange ceased quoting spot cotton at so many points above or below the futures prices, and instead set the nominal quotation of 8.25 cents a pound, pending clarification of the situation. This was the situation until October 3 when the price advanced to 8.30 cents because of the ending of fears of war in Europe. It reached 8.50 on October 7th, and gives indication of moving into higher channels. Quotations for middling uplands on the Exchange follow:

	Sept. 12	October 10		
	Close	High	Low	Close
October	7.94	8.22	8.12	8.24
December	7.96	8.30	8.16	8.29
March	7.95	8.21	8.12	8.21

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.27	@	.27½
Peeler, carded, 23/4/3	lb.	.28	@	.28½
Peeler, carded, 15/3/3	lb.	.25	@	.25½
Peeler, carded, 13/3/3	lb.	.24	@	.24½
Egyptian, carded, 23/5/3	lb.	.40	@	.40½
Egyptian, combed, 23/5/3	lb.	.45	@	.45½

CHAFERS

Carded, American, 1¼"	lb.	.27½	@	.28
Carded, American, 1"	lb.	.18	@	.23

Sheetings

48x40	36 in.	5.50	lb.	— @	.035⅜
40x40	36 in.	6.15	lb.	— @	.03¾
40x36	36 in.	6.50	lb.	— @	.03⅜
48x48	40 in.	2.50	lb.	— @	.07
48x48	40 in.	2.85	lb.	— @	.06⅛
56x60	40 in.	3.60	lb.	— @	.05⅞
48x44	40 in.	3.75	lb.	— @	.05⅛
44x40	40 in.	4.25	lb.	— @	.04½

Ducks

Enameling (single filling)	lb.	.21	@	.23
Belting and Hose	lb.	.25	@	—
Single filling, A grade	lb.	.09½	@	.12½
Double filling	lb.	.10½	@	.13½

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM SEPTEMBER 13 TO OCTOBER 10

Date	Spot	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Sales
Sept. 13	16.05	16.05	16.09	16.14	16.16	16.22	16.24	16.26	16.28	16.30	16.34	16.38	16.42	——	426
14	16.25	16.20	16.20	16.25	16.31	16.38	16.38	16.38	16.41	16.43	16.45	16.47	16.50	——	330
15	16.22	16.18	16.18	16.25	16.30	16.33	16.36	16.40	16.43	16.46	16.48	16.51	16.54	——	751
16	16.08	16.05	16.05	16.09	16.13	16.17	16.18	16.20	16.25	16.30	16.31	16.33	16.36	——	90
17															
18															
19	16.08	16.06	16.09	16.13	16.17	16.19	16.23	16.26	16.29	16.30	16.32	16.34	16.37	——	264
20	16.50	16.45	16.48	16.53	16.58	16.61	16.63	16.66	16.69	16.73	16.74	16.75	16.77	——	354
21	16.45	16.32	16.33	16.40	16.48	16.55	16.56	16.57	16.59	16.62	16.64	16.66	16.68	——	272
22	16.40	16.34	16.35	16.38	16.42	16.46	16.49	16.52	16.54	16.57	16.62	16.67	16.71	——	69
23	16.08	16.00	16.00	16.07	16.14	16.17	16.21	16.25	16.28	16.32	16.36	16.40	16.44	——	186
24															
25															
26	15.95	15.91	15.91	15.94	15.98	15.98	15.98	15.98	15.99	15.98	16.00	16.01	16.03	——	610
27	15.20	15.20	15.20	15.23	15.27	15.18	15.18	15.10	15.17	15.20	15.22	15.25	15.28	——	548
28	15.66	——	15.60	15.63	15.66	15.66	15.66	15.66	15.70	15.73	15.74	15.75	15.77	——	650
29	16.00	——	15.84	15.91	15.98	16.00	16.00	15.98	16.01	16.04	16.04	16.06	16.08	——	466
30	16.65	——	16.52	16.57	16.60	16.67	16.67	16.63	16.66	16.66	16.69	16.70	16.72	——	864
Oct. 1															
2															
3	16.67	——	16.56	16.60	16.62	16.65	16.65	16.66	16.68	16.70	16.72	16.75	16.78	16.81	242
4	16.80	——	16.70	16.75	16.81	16.83	16.83	16.84	16.84	16.87	16.88	16.90	16.92	16.94	232
5	17.06	——	17.00	17.03	17.05	17.09	17.09	17.10	17.12	17.13	17.16	17.17	17.20	17.22	498
6	16.98	——	16.90	16.93	16.96	16.98	17.01	17.04	17.03	17.02	17.05	17.07	17.08	17.09	383
7	17.05	——	16.95	17.00	17.05	17.06	17.08	17.10	17.14	17.18	17.19	17.20	17.24	17.29	140
8	17.30	——	17.24	17.27	17.30	17.30	17.32	17.34	17.34	17.34	17.34	17.36	17.38	17.40	209
9															
10	17.25	——	17.13	17.21	17.29	17.28	17.28	17.30	17.33	17.36	17.36	17.37	17.39	17.41	261

New York Rubber CHEMICAL Markets

October 10, 1938

All Quotations F.O.B. Works Unless Noted

ACCELERATORS

Organic				
A-1 (Thiocarbanilid)	lb.	.26	@	—
A-5-10	lb.	.35	@	.40
A-11	lb.	.52	@	.65
A-19	lb.	.52	@	.65
A-32	lb.	.70	@	.80
A-77	lb.	.42	@	.55
A-100	lb.	.42	@	.55
A-433	lb.	.45	@	.55
Aldehyde ammonia, crystals	lb.	.70	@	—
Altax	lb.	.55	@	.70
Butyl Zimate	lb.	3.00	@	—
Captax	lb.	.50	@	.60
Crylene	lb.	.55	@	.65
paste	lb.	.45	@	.55
Di-Ortho-Tolyguanidine	lb.	.44	@	.46
Diphenylguanidine	lb.	.35	@	.45
El-Sixty	lb.	.57	@	—
Ethyl Zimate	lb.	3.00	@	—
Ethylidene aniline	lb.	.42	@	.43
Formaldehyde aniline	lb.	.37½	@	.42
Guantal	lb.	.45	@	—
Heptene	lb.	.35	@	.40
Hexamethylenetetramine	lb.	.36	@	—
Lead Oleate, No. 999	lb.	.14	@	—
Witco		.15	@	—
Litharge	lb.	.18	@	.20
Methylenedianiline	lb.	.36	@	.37
Monex	lb.	3.25	@	—
Oxynone	lb.	.64	@	.80
Phenex	lb.	.50	@	.55
Pip-Pip	lb.	2.50	@	—
Pipsolene	lb.	1.55	@	1.85
R & H 40	lb.	.40	@	.41
R & H 50-D	lb.	.42	@	.43
R-2	lb.	1.40	@	1.80
R-23	lb.	.40	@	—
Rotax	lb.	.60	@	.65
Safex	lb.	1.20	@	1.25
SPDX	lb.	.75	@	—
Super-Sulphur No. 1	lb.	.50	@	—
No. 2	lb.	.20	@	.50
Thiocarbanilid, drums	lb.	.24	@	—
Trimene	lb.	.75	@	—
base	lb.	1.20	@	—
Triphenylguanidine	lb.	.60	@	—
Tuads	lb.	3.00	@	—
Ureka	lb.	.60	@	.75
Ureka Blend B	lb.	.60	@	.75
Ureka C	lb.	.56	@	.65
Vulcanex	lb.	.42	@	.43
Vulcone	lb.			
Vulcanol	lb.	.85	@	—
Z-88-P	lb.	.51	@	—
Zimate	lb.	3.00	@	—
Inorganic				
Litharge, domestic	lb.	.07	@	.07½
Magnesia, calcined, heavy	lb.	.04	@	—

COLORS

Blacks (See Compounding Materials)

Blues				
Prussian	lb.	.36	@	.37
Ultramarine	lb.	.15	@	—
Browns				
Mapico	lb.	.13	@	—
Umber, Turkey	lb	.04	@	.04½
Greens				
Chrome	lb.	.21	@	—
Chromium Oxide, bbl.	lb.	.21	@	—
Guignet's Green	lb.	.70	@	—
Reds				
Antimony				
crimson, 15/17	lb.	.45	@	—
sulfur, free	lb.	.48	@	.60
Indian English	lb.	.09	@	.10
Domestic (Maroon)	lb.	.11	@	—
Red oxide, pure	lb.	.10	@	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼	@	—
Whites				
Cryptone, No. 19	lb.	.05⅝	@	.06⅛
Cryptone CB, No. 2	lb.	.05⅝	@	.06⅛
Cryptone, ZS-20	lb.	.08⅜	@	.08⅝
Cryptone, ZS-86	lb.	.08⅜	@	.08⅝
Lithopone				
Albalith, black label—11	lb.	.04⅛	@	.04⅜
Azolith	lb.	.04⅜	@	.04⅝
Ray-bar	lb.	.05⅞	@	.06⅜
Ray-sal	lb.	.05⅞	@	.06⅜
Rayox	lb.	.16	@	.19
Titanox A	lb.	.15	@	.18
Titanox B	lb.	.05⅝	@	.06⅝
Titanox C	lb.	.05⅝	@	.06⅝
Zinc Oxide—American Process				
American Azo:				
ZZZ (lead free)	lb.	.06¼	@	.06½
Anaconda, lead free	lb.	.06¼	@	.06½
Horsehead Lead Free Brand:				
Special—3	lb.	.06¼	@	.06½
XX Red—4	lb.	.06¼	@	.06½
XX Red—72	lb.	.06¼	@	.06½
XX Red—78	lb.	.06¼	@	.06½
XX Red—103	lb.	.06⅓	@	.06½
Kadox, black label—15	lb.	.06½	@	.06¾
Blue label—16	lb.	.06½	@	.06¾
Red label—17	lb.	.06½	@	.06¾
St. Joe, black label	lb.	.06¼	@	.06½
green label	lb.	.06¼	@	.06½
red label	lb.	.06¼	@	.06½
U. S. P—7, bbls.	lb.	.09½	@	.09¾
Zinc Oxide—French Process				
Florence White seal—7 bbls.	lb.	.08½	@	.08¾
Green seal—8	lb.	.08	@	.08¼
Red seal—9	lb.	.07½	@	.07¾
Yellows				
Cadmolith	lb.	.50	@	.55
Chrome	lb.	.14½	@	.15½
Mapico	lb.	.09½	@	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.027	@	.062
Bone, powdered	lb.	.05½	@	.12½
Carbon, compressed	lb.	.0435	@	.0775
uncompressed	lb.	.0435	@	.0775
"Certified"	lb.	—	@	—
Spherons	lb.	—	@	—
"Disperso"	lb.	.027	@	.036
Drop, bbls.	lb.	.05½	@	.14
"Excello," compressed	lb.	.027	@	.0775
"Fumonex"	lb.	.03	@	.07
"Gastex"	lb.	.03	@	.07
Lampblack	lb.	.07	@	.12
"Micronex"	lb.	.027	@	.036
"Supreme"	lb.	.027	@	.0775
Thermatomic—"P 33"	lb.	.04¾	@	.07¾
"Thermax"	lb.	.01¾	@	.05
United "Dixie" & "Kosmos"	lb.	.027	@	.036

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85	@	24.50
Ammonia carbonate, lump	lb.	.10½	@	.12
Asbestine	ton	13.00	@	15.00
Barium carbonate (98-100%)	ton	—	@	—
Barium Dust	lb.	.05	@	.06
Barytes	ton	23.65	@	31.15
Basofor	lb.	.04½	@	—
Bentonite	lb.	.02	@	.03
Blanc fixe dry f.o.b. works	ton	60.00	@	65.00
Calcene	ton	37.50	@	45.00
Catalpo (fact.)	lb.	.02	@	—
Chalk, precipitated				
Suprex white, extra lt	ton	45.40	@	60.00
heavy	ton	45.00	@	55.00
Clay, Kaolin, domestic	ton	7.50	@	15.00
Aerfloted, Suprex	ton	9.50	@	21.00
Congaree	ton	9.50	@	—
Crown (f.o.b. plant)	ton	9.50	@	—
Dixie	ton	11.00	@	30.00
Dixie, Jr.	ton	9.50	@	29.00
McNamee	ton	9.50	@	22.00
Par	ton	9.50	@	22.00
Witco	ton	9.50	@	—
Cotton Flock	lb.	.11	@	.15
Glues, extra white	lb.	.28	@	.30
medium white	lb.	.14	@	.19
Kalite No. 1	ton	24.00	@	50.00
Kalite No. 3	ton	34.00	@	60.00
"Lime Crest" Industrial Filler No. 100	lb.	—	@	—
Magnesium carbonate	lb.	.07½	@	—
Mica	ton	35.00	@	44.00
Pyrax A	ton	7.50	@	20.00
Rottenstone (powdered)	lb.	.02½	@	.05
Soapstone, powdered	ton	16.00	@	22.00
Starch, powdered	cwt.	2.90	@	4.10
Talc, domestic	ton	17.00	@	20.00
Whiting, commercial	ton	17.00	@	18.00
Columbia Filler	ton	9.00	@	14.00
English Cliffstone	ton	33.00	@	43.00
Witco	ton	6.00	@	—
Wood Flour	ton	20.00	@	25.00
Zinc Carbonate	lb.	—	@	.10¾
Zinc Stearate	lb.	—	@	—

MINERAL RUBBER

285°-300° Mineral Rubber	ton	22.00	@	42.00
Black Diamond	ton	27.00	@	—
Genasco, solid (factory)	ton	25.00	@	27.00
Hard Hydrocarbon	ton	22.00	@	42.00
Parmr, solid	ton	25.00	@	—
Pioneer, MR, solid	ton			
Pioneer-granulated	ton			

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50	@	4.00
Rodo #10	lb.	4.50	@	5.00
Curodex 19	lb.	2.75	@	—
Curodex 188	lb.	3.50	@	—
Curodex 198	lb.	4.50	@	—
Para-Dors No. 5145	lb.	2.00	@	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.40	@	—
Darvan (dispersing agent)	lb.	.30	@	.50
Santomerse (dispensing, wetting, penetrating and stabilizing agent)	lb.	.13	@	—
Sunproof	lb.	.35	@	.37½
Sponge Paste	lb.	—	@	.80
Tackol (tackifier)	lb.	.115	@	—
Tonox	lb.	.56	@	.60

SOFTENERS

Acids				
Acetic, 28%, bbls.	100 lb.	2.53	@	2.78
Nitric, 36 degrees	cwt.	5.00	@	6.00
Sulfuric, 66 degrees	ton	15.50	@	16.50
Acids, Fatty				
Laurex	lb.	.15	@	.16
Stearex Beads	lb.	.10¾	@	.11¾
Stearic, double pressed	lb.	.12½	@	.13½
Stearite	lb.	.10½	@	.11¾
Alkalies				
Caustic Soda, 76%	cwt.	3.15	@	3.80
Soda Ash, 58%, C.L.	cwt.	—	@	2.35
Oils				
Cycline Oil	gal.	.20	@	—
Degras, bbls.	lb.	.07¾	@	.08
Fluxrite	lb.	.05½	@	.06½
Palm Niger	lb.	.05½	@	.06½
Para-Flux	gal.	.17	@	—
Petrolatum, light	lb.	.03½	@	.03¾
Pigmentaroil, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
Pine, steam distilled	gal.	.64	@	.69
dest. dist., drums	gal.	.49	@	.50
Rosin Oil, cmpd	gal.	.40	@	—
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rubtack	lb.	.08	@	.10
Seedine, c.l.	lb.	.07¼	@	—
Tackol	lb.	.08½	@	.18
Witco Palm Oil	lb.	.07	@	—
Witco Softener No. 20	gal.	.20	@	—
Woburn No. 8, c.l.	lb.	.06	@	—
Wobonite, c.l.	lb.	.05	@	—
Resins and Pitches				
Pitch, Burgundy	lb.	.05½	@	.06½
coal tar	ton	19.00	@	22.00
hardwood	ton	16.00	@	22.50
pine, 200 lb. gr. wt.	bbl.	6.00	@	6.50
Pigmentar, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
R. S. L. Resin	lb.	—	@	—
Retort Pine Tar, drums	ton	20.00	@	26.00
Solvents				
Acetone, pure	lb.	—	@	.06¼
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33	@	.39
Benzene, 90%	gal.	.18	@	.23
Beta-Trichlorethane	gal.	—	@	.20
Bondogen	lb.	.98	@	1.65
Carbon, bisulfide	lb.	.05¼	@	.08
Carbon tetrachloride	lb.	.05¾	@	.08¼
Dichlorethylene	lb.	—	@	.25
Dipentene, cml., drums	gal	.41	@	.50
Dryolene (f.o.b. Okla.)	gal.	.10	@	.10½
Ethylene dichloride	lb.	.05½	@	.06½
Plastogen	lb.	.07¾	@	.12½
Reogen (drums)	lb.	.11½	@	.20
Rub-Sol (f.o.b. Okla.)	gal.	.09	@	—
Trichlorethylene	lb.	—	@	.09½
Turpentine, spirits	gal.	.43	@	.47
dest. dist., drums	gal.	.33	@	.41
Waxes				
Beeswax, white	lb.	.39	@	.45
Carnauba, yellow	lb.	.46	@	.47½
Ceresin, white, dom.	lb.	.08	@	.11
Montan, crude	lb.	.10¾	@	.11¾
Paraffin (c.l.—f.o.b. N. Y.)				
Yellow crude scale	lb.	.02¾	@	—
White crude scale 124/126	lb.	.02¾	@	.03
Refined, 122/127	lb.	.04½	@	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50	@	2.10
Exel	lb.	1.00	@	1.40
Gel	lb.	.57	@	.77
Hipar	lb.	.65	@	.92
Powder	lb.	.52	@	.73
Resin	lb.	.52	@	.73
Resin D	lb.	.52	@	.73
White	lb.	1.25	@	1.75
Albasan	lb.	.70	@	.75
Antox	lb.	.56	@	—
B-I-F	lb.	.57	@	—
Flectol H	lb.	.54	@	—
Flectol White	lb.	1.00	@	—
Flectol B	lb.	.54	@	—
Neozone	lb.	.63	@	—
Oxynone	lb.	.68	@	—
Perflectol	lb.	.67	@	.75
Retardex	lb.	.35	@	.40
Santoflex A	lb.	—	@	—
Santoflex B	lb.	.54	@	—
Stabilite	lb.	.57	@	.62
Stabilite Alba	lb.	.70	@	.75
VGB	lb.	.55	@	.60

MOLD LUBRICANTS

Aresklene	lb.	—	@	—
Cocoa Soapstock	lb.	.06	@	.08
Dipex	lb.	.06	@	.08
Lubrex	lb.	.25	@	.30
Mold Paste	lb.	.18	@	—
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rusco, f.o.b. Nitro	lb.	.12	@	.30
Sericite, f.o.b. N Y.	ton	65.00	@	—
Soap Tree Bark, cut, sifted	lb.	.06	@	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.19	@	—
Black	lb.	.07	@	.11
White	lb.	.08	@	.12
Brown	lb.	.085	@	.14
Neophax	lb.	.10¼	@	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½	@	.15
Sulfur Chloride, yellow (drs.)	lb.	.04	@	—
Sulfur flour,				
Refined, 100% pure (bags)	cwt.	2.50	@	3.65
Commercial (bags)	cwt.	1.60	@	2.35
Telloy	lb.	2.00	@	—
Vandex	lb.	2.00	@	—

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1922	**301,076**	**101,843,188**	**15.10**	**4,809**	**1,921,828**	**17.84**	**296,267**
1923	**309,362**	**185,060,304**	**26.71**	**8,772**	**5,672,319**	**28.87**	**300,590**
1924	**325,899**	**173,367,272**	**23.75**	**10,309**	**6,057,637**	**26.23**	**315,590**
1925	**393,370**	**426,167,504**	**48.36**	**14,827**	**19,847,753**	**59.76**	**378,543**
1926	**409,944**	**501,131,064**	**54.57**	**17,671**	**22,470,583**	**56.77**	**392,273**
1927	**424,733**	**338,688,492**	**35.60**	**27,775**	**24,735,488**	**39.76**	**396,958**
1928	**432,633**	**242,727,423**	**25.05**	**32,159**	**18,128,761**	**25.17**	**400,474**
1929	**560,082**	**239,177,811**	**19.06**	**36,485**	**16,868,718**	**20.64**	**523,597**
1930	**482,083**	**139,133,048**	**12.88**	**30,205**	**9,310,205**	**13.76**	**451,878**
1931	**497,176**	**72,922,845**	**6.55**	**25,595**	**4,255,572**	**7.42**	**471,581**
1932	**409,556**	**31,936,459**	**3.48**	**20,930**	**2,015,612**	**4.30**	**388,626**
1933	**407,817**	**44,034,064**	**4.82**	**20,537**	**2,601,352**	**5.65**	**387,280**
1934	**449,513**	**97,929,676**	**9.73**	**23,848**	**5,770,109**	**10.80**	**425,665**
1935	**453,134**	**115,299,448**	**11.36**	**11,389**	**3,084,331**	**12.09**	**441,745**
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1937:							
July	**41,493**	**19,010,273**	**20.45**	**767**	**300,301**	**17.48**	**40,726**
Aug.	**48,020**	**20,595,314**	**19.15**	**670**	**265,298**	**17.69**	**47,350**
Sept.	**55,123**	**22 119,248**	**17.91**	**668**	**280,741**	**18.76**	**54,455**
Oct.	**51,171**	**20,250,893**	**17.67**	**450**	**172,466**	**17.13**	**50,721**
Nov.	51,958	19,905,523	17.01	159	66,501	18.72	51,799
Dec.	68,006	24,934,206	16.37	290	91,764	14.14	67,716
1938:							
Jan.	43,984	15,115,732	15.34	325	118,514	16.27	43,659
Feb.	39,380	13,095,429	14.85	305	109,756	16.08	39,075
Mar.	41,592	13,494,654	14.48	646	198,865	13.74	40,946
Apr.	31,042	9,495,476	13.66	250	75,797	13.55	30,792
May	27,229	8,010,250	13.13	528	167,831	14.20	26,701
June	24,983	7,150,115	12.29	399	116,458	13.03	25,584
July	21,271	5,723,381	11.74	420	127,522	13.54	21,351
Aug.	30,798	8,477,231	12.29	432	133,350	13.79	30,366

* Revised.

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	**1,356**	**536,392**	**464**	**568,456**	**6,165**	**1,237,100**	**2,157**	**864,059**
1925	**3,781**	**1,803,448**	**517**	**574,750**	**6,749**	**1,642,531**	**3,272**	**3,537,510**
1926	**4,305**	**2,362,096**	**354**	**327,213**	**7,263**	**3,127,757**	**3,394**	**4,686,743**
1927	**5,018**	**2,674,957**	**582**	**477,246**	**7,785**	**2,448,657**	**1,495**	**1,170,650**
1928	**3,077**	**1,755,685**	**731**	**430,855**	**7,552**	**2,540.059**	**4,007**	**2.121,786**
1929	**1,275**	**545,175**	**728**	**566,964**	**8,204**	**2,458,126**	**3,729**	**1,788,391**
1930	**1,096**	**347,388**	**502**	**422,684**	**5,907**	**1,403,244**	**4,458**	**1,508,786**
1931	....	.....	**1,207**	**411,380**	**5,777**	**1,019,010**	**4,675**	**888,909**
1932	....	.....	**707**	**147,403**	**4,607**	**616,596**	**5,112**	**601,999**
1933	....	.....	**1,659**	**2,261,869**	**5,990**	**944.895**	**11.085**	**1.833.671**
1934	**398**	**75,349**	**1,054**	**438,209**	**4,987**	**943,752**	**13,107**	**3,643.221**
1935	**459**	**86,835**	**615**	**188,384**	**5,644**	**1,063.126**	**13.553**	**3,782,222**
1936	**1,229**	**286,552**	**535**	**199,368**	**6,163**	**1,296,364**	**19.852**	**6,659,899**
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1937:								
July	**371**	**106,360**	**22**	**9.363**	**533**	**158,998**	**1,921**	**924,127**
Aug.	**335**	**95,893**	**16**	**5,876**	**363**	**107,611**	**1,801**	**838,778**
Sept.	**329**	**90,822**	**5**	**2,196**	**701**	**214,511**	**1,901**	**839,159**
Oct.	247	68,178	29	12,090	460	149,516	1,958	844,205
Nov.	251	69,452	29	9,374	593	194,889	2,085	875,074
Dec.	140	34,347	31	11,491	1,325	470,553	1,804	694,164
1938:								
Jan.	**538**	**147,685**	**23**	**8,958**	**598**	**224,443**	**1,400**	**494,242**
Feb.	218	60,097	33	11,393	892	355,080	1,684	560,883
Mar.	150	41,518	69	19,454	587	239,271	979	327,844
Apr.	188	50,423	66	25,741	1,265	444,756	889	295,690
May	229	61,756	29	8,806	900	274,652	879	279,502
June	150	41,518	34	11,496	918	276,126	695	214,420
July	223	49,099	51	16,130	869	267,491	634	209,526
Aug.	250	53,285	41	13,637	526	159,784	876	308,573

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

	Figures on Monthly Basis: 1931*	1932*	1933*	1934*	1935*	1936*	1937*	1938
Jan.	28,640	29,648	22,645	39,190	46,636	48,631	50,879	29,429
Feb.	28,880	31,821	21,392	40,515	42,720	36,841	51,950	23,868
Mar.	32,883	29,505	17,843	47,003	42,153	42,813	54,129	30,487
Apr.	33,418	27,518	25,928	44,853	44,247	52,031	51,859	27,984
May	37,927	30,957	44,074	42,918	41,101	50,612	51,795	28,947
June	38,027	41,475	50,743	40,147	36,156	52,772	51,860	30,629
July	32,030	29,976	49,614	32,553	35,917	48,250	43,703	32,209
Aug.	27,666	23,721	44,428	33,216	38,775	46,777	41,506	38,170
Sept.	23,707	23,847	35,281	30,258	37,086	46,449	43,945	
Oct.	22,342	22,286	31,543	31,253	41,969	49,637	38,754	
Nov.	23,010	23,231	28,831	34,748	42,310	50,433	34,025	
Dec.	21,470	18,015	28,757	36,569	42,474	49,754	29,195	
Tot.	350,000	332,000	401,079	453,223	491,544	575,000	543,600	

* Revised.

Note: Figures for 1931-1937 were revised in May, 1938, and are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks[a]	Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks[a]
1928	208,516	223,000	50.4	24,785	1933	99,560	81,602	19.9	20,746
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	113,078*	23.0*	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	141,486*	24.6*	19,000*
1932	75,608	77,504	23.4	16,354	1937	178,776	157,990	29.1	26,260

Figures on Monthly Basis	Production	Consumption: Tons	Consumption: % to Crude	Stocks[a]		Production	Consumption: Tons	Consumption: % to Crude	Stocks[a]
1937:									
Jan.*	15,129	14,450	28.4	18.822	July	16,241*	12,128*	27.8*	17,682*
Feb.*	15,192	14,578	28.1	18,496	Aug.	16,543*	13,227*	31.9*	19,706*
Mar.*	14,462	15,601	28.9	16,450	Sept.	16,410	13,681	37.4	21,597
Apr.	13,884	15,607	30.1	14,046	Oct.	15,849	12,234	31.6	23,572
May	15,793	14,693	28.4	14,647	Nov.	12,406	9,703	28.6	24,620
June	16,052	14,414	27.8	14,535	Dec.	10,815	7,674	26.3	26,260
1938:									
Jan.	8,467	6,673	22.7	27,179	July	7,109	8,273	25.7	18,832
Feb.	6,012	6,867	28.8	26,431	Aug.	10,472	10,732	28.1	17,892
Mar.	6,669	8,573	27.1	24,401	Sept.	.....	.....	...	.....
Apr.	6,399	7,480	26.7	23,339	Oct.	.....	.....	...	.....
May	6,866	8,009	27.7	22,275	Nov.	....	.....	...	.....
June	7,584	8,274	27.0	21,040	Dec.	.....	.....	...	.....

[a] Stocks on hand at the end of month or year.

* Revised.

Note: Figures for 1936 were revised on June 1, 1937, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1936*	1937	1938		1936*	1937	1938
January	32,344	33,696	35,176	August	46,061	49,597	50,459
February	27,178	32,000	31,861	September	44,366	47,245	
March	35,864	40,561	41,259	October	44,163	45,361	
April	38,864	43,409	43,254	November	39,954	42,666	
May	42,010	45,484	44,911	December	39,590	39,457	
June	44,522	48,580	48,293				
July	46,865	50,704*	47,474	Total	481,606	518,760	

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1926	24,199,524	1930	17,364,096	1934	12,255,118
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,302	1933	8,713,962	1937	22,257,964

1938		1938		1938	
January ...	527,899	May	706,188	September .	819,089
February ..	477,600	June	527,121	October ...	.....
March	854,031	July	406,419	November ..	.....
April	970,545	August	467,506	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—New York Market

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1936																																
June	15⅝	15⅝	15¾	15⅛	15⅛	15⅛	16⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15¾	16⅝	15⅛	16	15¾	15⅛	15⅛	15⅝	16⅛	15⅛	16⅛	16⅛	16⅛	16	16⅛	16⅛	16⅛	16⅛	16⅛	15⅝
July	16⅛	16⅛	16⅞	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅝	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Aug.	16⅞	16⅞	16⅞	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Sept.	16⅞	16⅞	16⅞	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Oct.	16⅞	16⅞	16⅞	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Nov.	16⅞	16⅞	16⅞	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	16⅞	16⅞	16⅞	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
1937																																
Jan.	21	21⅞	21⅞	20⅞	20⅞	21⅛	21⅛	21⅛	22⅛	22⅛	22⅝	22⅛	22	21⅛	21⅛	21⅜	21⅜	20⅛	20⅛	21⅛	20⅛	20⅝	20⅝	20⅝	20⅝	21⅜	21⅜	21⅝	21⅝	21⅝	21⅝	21⅝
Feb.	21⅞	21⅞	21⅞	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	23⅝	23⅛	23⅝	23⅝	23⅝	24⅜	24⅜	23⅝	24⅜	24⅛	24⅛	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜
Mar.	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛
April	26⅜	26⅜	26⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜	25⅜
May	21	21	21	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛
June	20⅛	20⅛	19⅞	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛
July	19⅞	19⅞	18⅞	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛
Aug.	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛
Sept.	18⅛	18⅛	18⅛	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Oct.	18⅛	18⅛	18⅛	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Nov.	15⅞	15⅞	15⅞	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½	15½
Dec.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
1938																																
Jan.	14½	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞
Feb.	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞
Mar.	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞
April	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞
May	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞
June	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞
July	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞
August	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
Sept.	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
Oct.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1911-1930

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	**37.72**
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	**22.48**
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	**20.55**
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	**11.98**

Average Monthly Price per Pound Since 1930

	1931 Cents	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents
Jan.	8.34	4.38	3.08	9.32	13.10	14.35	21.37	**14.63**
Feb.	7.70	4.03	2.95	10.45	12.92	15.48	21.33	**14.71**
Mar.	7.71	3.35	3.01	11.01	11.51	15.89	24.09	**13.55**
Apr.	6.43	3.02	3.56	12.10	11.55	15.98	23.44	**11.84**
May	6.49	3.09	4.95	13.26	12.05	15.62	21.14	**11.57**
June	6.35	2.66	6.15	13.51	12.57	15.85	19.29	**12.57**
July	6.37	2.89	8.01	14.60	12.10	16.49	18.86	**15.37**
Aug.	5.38	3.63	7.31	15.47	11.98	16.25	18.37	**16.08**
Sept.	5.08	3.84	7.30	15.36	11.55	16.46	18.55	**16.15**
Oct.	4.87	3.65	7.64	13.96	12.62	16.55	16.28	
Nov.	4.65	3.44	8.66	13.04	13.15	17.97	14.60	
Dec.	4.64	3.24	8.87	12.98	13.28	20.01	15.41	
Average for Year	6.17	3.49	5.96	12.92	12.37	16.41	19.39	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1938 July	1938 Aug.	1938 Sept.	1938 Oct.	Day	1938 July	1938 Aug.	1938 Sept.	1938 Oct.
1	7¼	—	7⅞	—	17	—	7⅞	—	
2	—	7⅛	7⅞	—	18	7⅞	7⅞	—	
3	—	7⅛	—	8⅛	19	7⅞	7⅞	7⅛	
4	7½	7⅛	—	8⅛	20	7½	—	8⅛	
5	7¼	7⅛	7⅞	8¼	21	7⅛	—	8⅛	
6	7¼	—	7⅛	8⅜	22	7⅛	7⅛	7⅛	
7	7⅛	—	7⅛	8⅛	23	—	8	7⅞	
8	7¼	7⅛	7⅞	8⅜	24	—	8⅛	—	
9	—	7⅛	7⅛	—	25	7¾	8	—	
10	—	7⅛	—	8⅛	26	7⅝	8⅛	7⅝	
11	7¼	7⅞	—	—	27	7⅛	—	7⅝	
12	7⅛	7¾	8⅛	—	28	7⅛	—	7⅞	
13	7⅞	—	8	—	29	7⅛	7⅞	7¾	
14	7¼	—	7⅛	—	30	—	7⅞	8⅛	
15	7⅛	7¾	8⅛	—	31	—	7⅛	—	
16	—	7⅛	7⅛	—					

Average Monthly Price Per Pound

Month	1935 Pence	1936 Pence	1937 Pence	1938 Pence	Month	1935 Pence	1936 Pence	1937 Pence	1938 Pence
Jan.	6.434	6.758	10.378	**7.077**	Aug.	5.696	7.581	8.830	**7.841**
Feb.	6.292	7.255	10.503	7.029	Sept.	5.508	7.577	8.935	7.918
Mar.	5.745	7.450	11.766	6.590	Oct.	6.130	7.898	7.855	
Apr.	5.604	7.502	11.471	5.793	Nov.	6.308	8.572	7.080	
May	5.822	7.335	10.250	**5.632**	Dec.	6.340	9.580	7.332	
June	6.027	7.352	9.548	6.147	Average for Year	5.976	7.713	9.424	
July	5.801	7.696	9.136	7.464					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1938 Aug.	1938 Sept.	1938 Oct.	Date	1938 Aug.	1938 Sept.	1938 Oct.	Date	1938 Aug.	1938 Sept.	1938 Oct.
1	8.61	8.35	8.25	11	8.43	—		22	8.32	8.25	
2	8.59	8.33	—	12	8.27	8.06		23	8.38	8.25	
3	8.56	8.22	8.30	13	8.25	7.88		24	8.32	8.25	
4	8.61	—	8.35	14	—	7.95		25	8.36	—	
5	8.52	—	8.40	15	8.27	7.99		26	8.46	8.25	
6	8.53	8.10	8.45	16	8.33	7.95		27	8.42	8.25	
7	—	8.18	8.50	17	8.40	8.25		28	—	8.25	
8	8.36	8.19	8.50	18	8.37	—		29	8.30	8.25	
9	8.36	8.08	—	19	8.42	8.25		30	8.46	8.25	
10	8.46	8.01	8.50	20	8.42	8.25		31	8.35	—	
				21	—	8.25					

Average Monthly Price Per Pound

	1935 Cents	1936 Cents	1937 Cents	1938 Cents		1935 Cents	1936 Cents	1937 Cents	1938 Cents
Jan.	12.70	11.91	13.06	**8.57**	Aug.	11.48	12.28	10.41	**8.41**
Feb.	12.58	11.53	13.15	8.91	Sept.	10.80	12.31	9.02	8.17
Mar.	11.63	11.43	14.46	8.92	Oct.	11.28	12.30	**8.42**	
Apr.	11.73	11.71	14.23	8.76	Nov.	12.01	12.23	**7.96**	
May	12.25	11.68	13.34	8.50	Dec.	11.99	12.83	**8.26**	
June	11.89	12.02	12.70	8.38	Average for Year	11.88	12.11	**11.44**	
July	12.26	13.11	12.26	8.85					

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of	ON HAND			AFLOAT			ON HAND AND AFLOAT		
	1936	1937	1938	1936	1937	1938	1936	1937	1938
Jan.	296,683	204,436	274,581	43,870	55,096	57,356	340,553	259,532	331,937
Feb.	293,631	195,692	294,338	46,532	53,538	47,459	340,163	249,230	341,797
Mar.	284,561	192,980	299,172	58,935	56,994	41,882	343,496	249,974	341,054
Apr.	277,478	176,289	301,436	47,678	72,530	39,071	315,156	248,819	340,507
May	262,415	175,273	299,720	48,860	58,542	32,859	311,275	233,815	332,579
June	245,544	172,056	294,566	47,228	57,215	32,079	292,872	229,271	326,645
July	235,850	167,094	284,914	60,343	75,779	40,400	296,193	242,873	325,314
Aug.	230,167	174,195	277,463	63,597	80,439	47,772	293,764	254,634	325,235
Sept.	233,336	186,193		62,240	83,288		295,576	269,481	
Oct.	224,000	200,025		67,825	80,653		291,825	280,678	
Nov.	211,480	222,707		73,691	81,302		285,171	304,009	
Dec.	223,000	262,204		56,567	63,099		279,567	325,303	

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London			Liverpool		
	1936	1937	1938	1936	1937	1938
January	84,791	29,005	40,203	77,188	41,895	21,711
February	79,757	26,508	46,596	77,138	37,078	24,737
March	74,779	21,292	50,233	72,823	30,622	26,220
April	68,932	21,128	54,296	71,388	27,443	28,277
May	61,349	21,351	57,194	69,150	25,081	29,862
June	55,993	21,964	60,307	66,173	21,258	31,837
July	49,575	22,589	62,236	63,715	19,424	32,825
August	45,749	25,211	65,113	62,367	19,817	34,315
September	44,364	28,462		59,485	21,190	
October	40,777	30,465		55,738	21,327	
November	37,495	33,304		51,184	21,399	
December	33,027	35,633		45,291	21,978	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
At end of 1937					
September	49,438*	38,131	5,294	135	1,543
October	41,948*	43,900	4,743	117	1,780
November	38,778	45,854	5,378	105	2,901
December	44,792*	45,734	5,632	100	1,771*
At end of 1938					
January	48,494*	49,643	5,976	131	2,024
February	46,241	47,990	5,653	169	2,342
March	50,797	48,473	5,490	180	1,212
April	40,614	45,008	4,812	155	1,083
May	40,598	45,426	4,876	169	816
June	44,729	49,290	4,488	190	904*
July	45,529	52,081	5,014	711	944

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
End of: 1937				
June	57,215	34,700	33,085	125,000
July	75,779	45,100	23,121	144,000
August	80,439	40,300	19,261	140,000
September	83,288	37,400	20,312	141,000
October	80,653	35,000	19,347	135,000
November	81,302	39,100	6,598	127,000
December	63,099	45,100	26,801	135,000
End of: 1938				
January	57,356	40,500	15,144	113,000
February	47,459	44,200	16,341	108,000
March	41,882	44,700	22,418	109,000
April	39,071	42,960	31,969	114,000
May	32,859	40,600	20,541	94,000
June	32,079	42,580	17,341	92,000
July	40,400	40,000	24,600	105,000
August	47,772	32,000	20,228	100,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate.

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1933	1934	1935	1936*	1937	1938
January	634,797	661,948	698,153	600,479	454,249*	551,632*
February	626,227	663,308	686,195	599,355	445,265*	569,242*
March	638,428	666,382	678,809	583,318	447,856*	591,968
April	629,159	658,796	677,006	567,172	428,249*	593,340
May	626,537	689,239	677,569	541,871	413,134*	577,063*
June	613,055	672,804	671,525	520,255	434,250*	583,952
July	618,258	676,200	679,061	519,074	445,782	593,481
August	617,449	674,702	680,644	500,520	457,462*	579,489
September	623,683	694,361	661,509	493,585	470,768*	
October	636,597	680,616	655,000	486,159	479,398*	
November	642,968	684,408	617,300*	466,491	493,266*	
December	654,890	705,975	613,987*	466,576	545,533*	
Monthly Avge.	630,171	677,395	666,397*	528,738	460,022*	

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Quarter	Production Figures on Quarterly Basis							
	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	12,323	11,004	6,635	13,437	13,355	11,798	16,142	7,71*
Apr.-June	16,295	12,980	14,412	13,565	12,597	15,443	16,421	8,570
July-Sept.	12,004	9,245	14,707	9,822	11,312	15,467	12,659	
Oct.-Dec.	8,117	6,856	9,550	10,406	12,099	15,409	10,063	
Total	48,739	40,085	45,304	47,230	49,363	58,117	55,285	

Quarter	Shipment Figures on Quarterly Basis							
	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,268	8,760	6,981	10,730	11,154	10,944	14,667	7,716
Apr.-June	15,919	18,021	15,139	14,998	13,473	16,530	16,324	10,745
July-Sept.	14,354	8,141	13,707	11,648	13,489	14,558	13,591	
Oct.-Dec.	8,510	5,329	8,265	9,310	12,066	13,331	10,864	
Total	50,051	40,251	44,092	46,686	50,182	55,363	55,446	

Quarter	Inventory Figures [2]							
	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar	10,014	9,878	7,290	11,651	11,675	9,087	12,488	10,808
Apr.-June	10,447	4,999	6,615	10,219	10,755	7,835	12,529	8,763
July-Sept.	8,158	6,096	7,595	8,419	8,288	9,012	11,615	
Oct.-Dec.	7,775	7,644	8,888	9,455	8,196	11,114	10,767	

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY [2]		
	1936	1937	1938	1936	1937	1938	1936	1937	1938
July	5,446	4,292	3,353	5,744	5,190	3,947	7,750	11,654	8,201
Aug.	5,017	3,983	4,093	4,977	4,889	4,046	7,799	10,813	8,330
Sept.	4,984	4,384		3,837	3,512		9,012	11,615	

AUTOMOBILE INNER TUBES

Quarter	Production Figures on Quarterly Basis							
	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,989	10,721	6,230	12,823	12,553	11,935	15,714	6,938
Apr.-June	15,388	11,913	13,001	13,191	11,631	14,678	15,299	7,177
July-Sept.	12,839	8,286	14,356	10,321	11,270	15,377	11,949	
Oct.-Dec.	8,117	5,970	9,000	9,891	12,425	15,257	9,024	
Total	48,333	36,890	42,587	46,226	47,879	57,247	51,986	

Quarter	Shipment Figures on Quarterly Basis							
	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,251	8,918	6,539	10,640	11,252	11,410	14,498	6.969
Apr.-June	15,314	16,271	13,292	14,553	11,928	15,169	15,381	9,301
July-Sept.	15,282	7,761	13,370	11,545	13,251	15,125	12,805	
Oct.-Dec.	8,174	4,961	8,189	8,306	11,636	12,921	9,693	
Total	50,021	37,911	41,390	45,044	48,067	54,625	52,377	

Quarter	Inventory Figures [2]							
	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	10,475	9,448	6,369	10,244	10,406	8,692	11,904	10,093
Apr.-June	10,504	5,174	6,097	8,795	10,050	8,105	11,746	8,108
July-Sept.	8,095	5,753	7,008	7,639	7,565	8,627	11,242	
Oct.-Dec.	7,922	6,749	7,815	9,180	8,231	10,985	10,235	

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY [2]		
	1936	1937	1938	1936	1937	1938	1936	1937	1938
July	5,177	4,019	2,784	5,758	5,046	3,356	7,725	10,869	7,512
Aug.	5,039	3,885	3,815	5,136	4,687	3,570	7,621	10,144	7,808
Sept.	5,161	4,044		4,231	3,073		8,627	11,242	

[1] Based on reports received from the Rubber Manufacturers Association.
[2] Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			Grand Total
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937*	4,808,974	3,915,889	893,085	207,000	152,631	54,369	5,015,974
1938							
Jan.*	209,506	155,505	54,001	17,624	13,385	4,239	227,130
Feb.*	186,523	139,380	47,143	16,066	11,753	4,313	202,589
Mar.*	221,796	174,065	47,731	16,802	12,276	4,526	238,598
Apr.	219,314	176,078	43,236	18,819	14,033	4,786	238,133
May	192,068	154,958	37,110	18,115	13,641	4,474	210,183
June	174,667	136,531	38,136	14,732	11,014	3,718	189,399
July	141,437	106,841	34,596	9,007	5,273	3,734	150,444
Aug.	90,484	58,624	31,860	6,452	3,063	3,389	96,936
Sept.	.....	.....	.....	.....	.....	.....	.....

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							NETHERLAND INDIES [4]							
	Gross Exports	Imports	Net Imports	Ceylon [2]	India & Burma [3]	Sarawak [3]	British North Borneo [3]	Siam [3]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [5]	World Total [6]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,704	9,814	7,155	9,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,296	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	35,551	83,978	125,969	208,699	43,387	15,576	12,721	1,120,576
1937:															
Apr.	58,718	17,136	41,582	3,419	1,186	2,960	783	1,899	6,999	8,916	15,944	2,098	1,522	962	88,270
May	51,152	17,350	33,802	4,607	1,007	742	778	2,238	7,530	8,939	20,835	2,888	1,063	1,010	85,439
June	54,809	23,614	31,195	5,149	1,092	1,890	813	2,933	8,269	12,290	24,804	3,673	762	945	93,815
July	71,863	26,100	45,763	6,279	966	2,543	1,414	3,175	7,512	11,557	23,520	5,563	854	1,416	110,562
Aug.	64,525	21,395	43,130	7,308	605	1,624	1,189	2,999	6,785	11,563	21,014	2,277	1,248	1,283	101,025
Sept.	67,414	19,065	48,349	5,804	1,092	2,659	969	3,173	6,402	10,862	19,611	4,131	1,007	1,145	105,204
Oct.	59,319	11,858	47,461	6,701	1,248	523	1,505	2,352	6,587	12,172	14,188	3,753	1,434	1,147	99,071
Nov.	57,850	12,396	45,454	4,391	2,135	2,517	1,327	2,549	6,310	10,003	11,596	4,556	963	1,037	92,838
Dec.	56,791	13,949	42,842	9,529	2,708	3,009	1,172	2,957	9,108	12,272	11,731	5,384	2,011	1,032	103,755
1938:															
Jan.	47,986	17,078	30,908	5,222	1,379	3,485	1,307	2,897	4,476	9,283	12,501	6,086	878	1,400*	79,822
Feb.	48,899	11,874	37,025	5,216	1,423	8	918	3,266	6,391	8,793	12,023	3,068	1,542	1,400*	81,056
Mar.	49,197	15,813	33,384	3,834	1,247	1,564	853	2,837	5,668	10,156	15,284	3,213	1,831	1,200*	80,209
Apr.	53,864	9,158	44,706	1,951	1,347	1,728	1,158	1,583	5,967	10,081	12,274	3,647	1,004	1,200*	86,644
May	38,245	10,325	27,920	2,833	1,283	1,648	815	2,507	4,575	7,515	9,741	3,118	1,053	1,200*	64,208
June	42,258	14,394	27,864	3,693	1,318	2,441	643	3,906	4,519	7,788	11,899	4,773	718	1,200*	70,762
July	43,689	18,713	24,976	3,861	1,083	2,057	937	4,707	6,808	8,271	19,765	5,136	625	1,200*	79,426
Aug.	47,246	13,735	33,511	4,400	1,227	965	728	4,564	4,757	7,329	10,912	3,838	700*	1,200*	74,391
Sept.	40,992	10,586	30,406												

All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. [1] Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. [2] Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. [3] Official statistics. [4] Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. [5] Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. [6] This total includes the third column for British Malaya and all other figures shown for other territories. * Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	24,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	28,904	19,164	14,970	4,343	4,680	2,400	13,063	1,063,798
1937:															
Apr.	42,066	3,808	5,291	8,664	1,343	5,837	1,669	1,532	1,058	1,069	362	1,070	200*	1,445	75,414
May	48,506	6,100	5,558	6,706	4,187	8,596	2,772	1,886	1,290	2,113	361	1,576	200*	925	90,776
June	48,972	5,157	6,010	6,469	3,791	7,608	1,958	3,940	2,226	1,630	521	1,802	200*	1,150	91,434
July	43,018	10,628	4,306	7,860	1,946	4,851	2,719	2,150	1,902	851	497	1,409	200*	733	83,090
Aug.	49,485	15,757	4,488	8,752	3,506	4,409	2,569	1,226	2,153	1,013	382	1,386	200*	1,692	97,018
Sept.	56,685	15,671	4,820	10,595	2,396	3,666	1,941	1,391	3,184	1,258	337	1,648	200*	1,369	105,161
Oct.	52,926	11,899	4,278	8,076	5,998	2,059	951	2,500*	2,470	967	367	1,535	200*	988	95,214
Nov.	54,135	12,878	4,311	8,848	4,787	1,368	2,857	2,500*	1,935	925	313	970	200*	846	96,873
Dec.	69,660	10,655	5,736	9,580	2,619	1,995	1,976	2,500*	767	1,286	318	1,008	200*	1,890	110,190
1938:															
Jan.	45,596	15,458	4,769	6,314	1,789	4,935	1,857	2,693	574	1,257	300	1,239	200*	1,102	86,083
Feb.	40,977	16,505	5,456	6,959	615	3,173	2,053	2,341	578	974	534	1,114	200*	1,771	82,843
Mar.	42,075	15,911	4,845	10,768	2,123	6,222	1,365	2,162	1,043	961	342	1,088	200*	1,324	90,429
Apr.	31,870	14,653	5,757	6,497	999	5,456	2,397	4,281	640	904	449	971	200*	920	75,994
June	26,429	14,053	4,542	7,460	3,243	2,145	2,399	4,000*	805	853	663	1,200*	200*	988	68,980
July	22,209	12,678	5,433	6,927	2,685	3,100	3,641	4,000*	1,215	1,106	526	1,200*	200*	635	65,555
Aug.	31,494	12,891		7,499							259				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Industry.

The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York, N. Y.

Chemicals and Compounding Materials —

ACCELERATORS—
El-Sixty, Ureka C, Guantal, Ureka, A-1, A-10, A-19, A-32, A-100, Pipsolene, Pip-Pip, DPG, R-2.
ANTIOXIDANTS — Flectols B, H, White.
MONSANTO CHEMICAL CO.
Rubber Service Laboratories Div.
1012 Second National Bldg., Akron, Ohio

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York, N. Y.

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 26 years.*
The Aluminum Flake Co.
Akron, Ohio

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

ASBESTINE—Specially prepared for use in Rubber. Send for liberal working samples.
SOLE PRODUCERS
International Pulp Co.
41 Park Row New York City

CALCENE—The Ideal low gravity, white reinforcing pigment. Gives high tensile and elongation properties with exceptionally good resistance to tear and abrasion.
The Columbia Alkali Corporation
BARBERTON, OHIO

CARBON BLACK—*Micronex*
the world's standard gas black, universally known as the "King of Rubber Pigments."
Binney & Smith Co.
41 East 42nd St. New York City

RATES
for Listings in this Section

$5.00 per listing per month.

10% Discount if 2 listings per month are used.

15% Discount for 3 or more listings per month.

Copy Subject to Style Regulations.
No cuts accepted.

CARBON BLACK
CONTINENTAL
The Newest Name in Carbon Black offers
CONTINENTAL DUSTLESS
CONTINENTAL COMPRESSED
CONTINENTAL UNCOMPRESSED
Continental Carbon Company
295 Madison Ave., New York, N.Y.

CARBON BLACK—*Aerfloted*
Arrow Black for rubber compounding. Standard for grit-free uniformity.
J. M. Huber, Inc.
460 West 34th St. New York

CARBON BLACK
SUPREME—*the up-to-date standard for rubber*
Imperial Oil & Gas Products Co.
Grant Building, Pittsburgh, Pa.

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CARBON BLACK
WITCO DISPERSO
and DUSTLESS and a
Complete Line of High Quality
Rubber Chemicals
Wishnick-Tumpeer, Inc.
295 Madison Ave., New York, N.Y.

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
33 Rector Street, New York City

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

CHEMICALS

For Rubber	For Industry Generally	
Accelerators	*Acids*	*Latex*
Antioxidants	*Oil of Myrbane*	*Lotol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Div. of U. S. Rubber Products, Inc.
1790 BROADWAY NEW YORK

CHEMICALS and Mineral
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

COLORS—*for Rubber*
Fine organic colors—Reds, Blues, Oranges, Violets, Greens—or any shade to meet your requirements—also Rubber Dispersed Colors
Ansbacher-Siegle Corporation
Rosenbank, Staten Island, N. Y.
820 So. Clinton St., Chicago, Ill.
Agents in Principal Cities

COLORS
BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures
MONSANTO CHEMICAL CO.
Rubber Service Laboratories Div.
1012 Second National Building
Akron, Ohio

THE MARKET PLACE Section Continued on Next Page